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## Egerton University



## Tegemeo Institute Of Agricultural Policy And Development

# DEVELOPING INCOME PROXY MODELS FOR USE BY THE USAID MISSION IN KENYA: A TECHNICAL REPORT 

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# Developing Income Proxy Models for use by the USAID Mission in Kenya: A Technical Report 

By<br>David Tschirley and Mary Mathenge

## I. Introduction

Governments, donors, and NGOs in developing countries spend billions of dollars every year on efforts to improve the well-being of rural households. Most of these interventions have the ultimate goal of reducing poverty, and many include specific objectives of increasing household incomes from specific activities such as microenterprise, cash cropping, food cropping, or livestock. Since an accurate assessment of these outcomes is costly and timeconsuming, much research has attempted to identify simple indicators which are correlated with the variables of interest. ${ }^{1}$ The income proxy models developed in Kenya are one method in this large and expanding toolbox of low cost approaches to monitoring otherwise complex indicators of household welfare.

The work in Kenya builds on and improves methods developed earlier in Mozambique (Tschirley, et al. 1999) and applied by NGOs there. The purpose of the models as currently developed in Kenya is to provide donors, government agencies, and other interested organizations with a low cost method to generate estimates of total household income, broken down by eight different income sources. In addition to generating estimates of mean incomes on a geographically disaggregated basis for monitoring purposes, the model results will be useful for a series of basic descriptive analyses to be described below.

This paper details the specific procedures utilized to develop the income proxy method for the USIAD/Kenya mission, reports on the performance of the method, and brings together in one place each part of the package needed to implement the method. The next section provides general background on income proxy methods; section III reports briefly on the Tegemeo/MSU Tampa full income survey that formed the basis for development of the proxy method; section IV provides details on model development, including definition of income components, the types of proxy variables tested, and the performance of the models; section V assesses model performance, and section VI touches on how the models can be used. A companion document (Developing Income Proxy Models for Use by Title II-funded NGOs in Kenya: A Technical Report for NGOs and USAID/Kenya) provides similar documentation for the modeling effort undertaken with NGOs.

[^0]
## II. Income Proxy Models: What Are They and How Can They Be Useful?

A. Background

An income proxy model is one part of a package of procedures that NGOs, donors, governments, or research institutions can use to monitor rural household income and income components using easy-to-collect proxy variables. The model is a set of algebraic equations that relate these proxy variables to components of income:

$$
\hat{Y}_{i}=a_{i}+b_{i 1} X_{i 1}+b_{i 2} X_{i 2}+\ldots+b_{i n} X_{i n}+e_{i}
$$

where,

| $i_{i}$ | is estimated income from component $i$, <br> is a constant (or intercept) term for income component $i$, |
| :--- | :--- |
| are the coefficients (fixed numbers) that quantify the relationship of each |  |
| $a_{i}$ |  |
| $b_{i 1} \ldots b_{i n}$ | proxy variable to income component $i$, |
| $X_{i 1} \ldots X_{i n}$ | are the selected proxy variables for income component $i$, and <br> is a random error term. |

is estimated income from component i ,
$\mathrm{a}_{\mathrm{i}} \quad$ is a constant (or intercept) term for income component i ,
$b_{\text {i1 }} \ldots b_{\text {in }} \quad$ are the coefficients (fixed numbers) that quantify the relationship of each proxy variable to income component $i$,
$e_{i} \quad$ is a random error term.
Taken together, the various components in the model sum to total household income: ${ }^{2}$

$$
\hat{Y}=\sum_{i=1}^{C} \hat{Y}_{i}
$$

where,
is estimated total income,
${ }_{i}$ is estimated income from component i , and
C is the number of income components.
These algebraic relationships are developed using standard "ordinary least squares" econometric techniques applied to a household data set which contains detailed data on household incomes and the proxy variables. Once this detailed data set is collected and the model is estimated, one needs only to collect the proxy variables to obtain estimates of income components and total household income. These simple proxy surveys will typically be conducted once a year, or however often the institution wishes to track household income. The much more detailed and time consuming income survey needs to be done once at the beginning of the project cycle and preferably again at the end of the cycle for validation

[^1]purposes. The complete package which defines the income proxy methodology includes 1) sampling guidelines for the periodic proxy surveys, 2 ) a model questionnaire for these surveys, 3) the set of econometric models relating the proxy variables to household income and income components, 4) SPSS/Windows syntax files based on these models that use the proxy data to generate the quantitative income estimates, and 5) a manual for operating the package.

The usefulness of an income proxy methodology derives from the importance of household income as an objective of development activities: an important overall development goal in nearly every developing country is the reduction of poverty and improvement in the incomes and well-being of rural households. Thus, measurement of household income is one logical choice for monitoring the effects of policies and programs oriented towards accomplishing this goal.
B. Monitoring or Impact Evaluation?

The econometric models in the income proxy methodology are designed to capture the association between income and the proxy variables, and to return as accurate a prediction as possible. As such, they can be used directly to monitor the types of economic activities that households engage in, and the incomes they derive from these activities. The models themselves are not designed to allow conclusions regarding cause and effect; to use these models for impact evaluation (for example, to measure the impact of an NGO's agricultural production and marketing assistance on agricultural and overall household income), they need to be integrated into an overall approach which includes the following elements:

- A sampling design that distinguishes between participants (the target population for the intervention being evaluated) and non-participants (the non-target population),
- A baseline survey conducted prior to the beginning of the intervention, distinguishing between likely participants and likely non-participants,
- The collection of complementary data regarding the physical, economic, and social environment of the participating and non-participating households.

It is beyond the scope of this paper to go into detail on impact evaluation; ${ }^{3}$ suffice it to say that, within such an integrated approach, use of income proxy models can allow more frequent monitoring (because it will be less costly and less time consuming), provide a richer set of monitoring results covering the range of the households' economic activities, and reduce the cost of the impact evaluation.

[^2]C. What Steps Are Needed to Develop an Income Proxy Model?

Figure 1 provides an overview of the process for developing and utilizing an income proxy model. Once the original, detailed data are collected and the prediction model is developed (Phases I and II), one need apply only Phases III \& IV for the remaining years of the program before collecting a new full data set to re-estimate the prediction model and perform a full evaluation of the program.

To develop the model, the analyst must work closely with users to:

1. Understand the design and operation of the interventions that are being monitored, and the economic environment where they are being implemented. The analysts developing the model need this type of information to define a set of econometric models that are meaningful for the user and that can be estimated with acceptable accuracy with proxy variables.

Figure 1. Overview of Process to Develop and Apply Income Prediction Models

```
Phase I - Collect or gain access to data set with full income data
and relevant proxies
Phase II - Develop prediction model
Full income data and proxies (from Analysis > Prediction model
Phase III - Collect, clean, and enter proxy data
Simple variables collected in intervention areas
Phase IV - Apply prediction model to proxy data to get income
estimates
Proxy data Prediction model \(\quad\)\begin{tabular}{l} 
Predicted household \\
income in intervention \\
area
\end{tabular}
```

2. Define a relevant and feasible breakdown of income components to be modeled.

The preferred definition will depend primarily on the types of economic activities which
are most important in the area where the intervention is taking place. For example, in a pastoral area with little crop production, the latter may be grouped into a single component, while livestock activities might be broken into several components. In an area of heavy cropping activities where livestock is less important, the reverse might hold.
3. As much as possible, anticipate the proxy variables that will be used to model each component. While not every proxy variable can be defined prior to the data analysis, many can be, and identifying a comprehensive list of probable and possible proxies ahead of time will improve the modeling results. As in the definition of income components, there will be substantial similarities in the definition of these variables across users, but if the income components are not identical, neither will the proxy variables be.
4. Design and conduct a detailed income survey that will provide the data to estimate the models. In the case of the models developed for USAID/Kenya, this survey was conducted by Tegemeo/MSU in 2000, and included design elements that anticipated the development of these models.
5. Estimate the models. The data must be entered, cleaned, organized, and then analyzed to develop the prediction models.
6. Develop a model questionnaire for the proxy surveys. Defining the models involves defining the most efficient set of proxy variables for each income component. Once this is done, a questionnaire is designed to collect just these proxy variables in future years. These questionnaires consist almost entirely of yes/no questions, with quantification of a limited number of variables. Thus, these questionnaires are much shorter, the interviews are shorter and easier to conduct, and the data are much easier to enter and clean than a full income survey. See Annex B for the proxy questionnaire designed for the USAID Mission models.
7. Develop a data processing routine to convert the proxy variables into estimates of income components and total income. Tegemeo/MSU have developed a SPSS/Windows syntax file that performs this function. It is available in electronic version upon request.

## D. Anticipated Time and Cost Savings from the Proxy Approach

Table 1 shows estimated time and cost savings of using a proxy approach as opposed to a full income survey. The numbers in the table are derived from Annex Table A1, which is based on Tegemeo's experience with the full income survey in 2000 and the proxy survey in 2002, and on NGOs' experience with the proxy method in 2003. The time and cost savings of the proxy approach come in all phases of the work. Questionnaire design for Phase III is limited to reviewing the model proxy questionnaire and making any small changes required for the specific circumstances (without, of course, changing the actual data to be gathered nor its structure). Tegemeo experience in 2002 and NGO experience in 2003 suggests that an interview for the simple proxy survey takes one-quarter or less time than an interview for the full income survey; total time savings in data collection will be less than this due to the fixed
costs of reaching villages and finding households within them, which is the same for each survey. The largest time savings come after data collection: due to lower data volume and simpler variables, post-coding and cleaning of the proxy data take about one-quarter or less time than the full survey, while data analysis takes about one week, compared to an estimated 3 months on a full income survey. ${ }^{4}$

On this basis, we conservatively estimate that the proxy survey reduce monetary costs compared to a full income survey by approximately $2 / 3$, and elapsed time (from the beginning of the exercise to having needed results from the data) by a similar amount, from over 30 weeks to about ten weeks. Analyst time is especially scarce in most organizations, and these overall figures mask the greater savings of their time; we estimate these savings to be over 80\% (Table 1, based on Annex Table A1).

Table 1. Indicative Time and Cost Savings of Proxy Approach Compared to Full Income Survey, Each Covering 1,500 Households

| Item | Estimated Cost (US\$) |  | Estimated Elapsed Time (weeks) |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Full Survey | Proxy Method | Full Survey | Proxy Method |
| Questionnaire design | 2,302 | 307 | 3.0 | 0.40 |
| Data collection | 43,362 | 23,412 | 7.0 | 7.00 |
| Post-coding and data entry | 4,721 | 1,180 | 3.0 | 0.75 |
| Data cleaning | 10,468 | 2,617 | 6.0 | 1.50 |
| Data analysis | 27,000 | 1,709 | 13.0 | 1.00 |
| Total | 87,853 | 29,225 | 32.0 | 10.65 |
| ... of which Analysts | 33,416 | 6,231 |  |  |

The proxy surveys of Phase III need be conducted only once a year, or however often the institution wishes to track household income and income sources. For validation purposes, the full income survey of Phase I survey should be conducted again at a later time and, if needed, the prediction models should be recalibrated.

It should be noted that these time and cost savings are achieved due to the up-front investment in developing the proxy models, the proxy questionnaire, and the processing routine to convert proxy variables into income estimates. These activities are all additional to what would normally be done with an income survey. Based on experience to date in Kenya, this process takes about one and one-half months of full-time work for an Analyst

[^3]and Senior Analyst. Thus, to be cost effective, and considering that a full income survey provides a richer data set for policy analysis, we suggest that the method be adopted only if it will meet critical M\&E needs during at least two years, and preferably more.

## III. The Tampa Data Set

The Tegemeo Institute "Tampa" survey, a joint undertaking by Tegemeo Institute/Egerton University and Michigan State University, contains about 1,500 households and is designed to be representative of 24 purposively chosen agricultural districts of the country. These districts were chosen to be representative of all but the non-marginal, largely pastoral, areas of the country. ${ }^{5}$ For the development of the income proxy models, data from Turkana and Garissa districts were eliminated, as were several cases considered to be outliers. In all, 1,392 cases were used in this analysis.

Because the Tampa sample was not fully randomized, and because the sample size was relatively small when compared to national surveys such as the Welfare Monitoring Survey, geographical breakdowns in this report are presented at a fairly aggregated level - four zones, each comprising more than one province. Breakdowns below this level, for example in Table 3 at the district level, are legitimate for internal evaluation of the income proxy models, but should not be compared to results from WMS surveys at that level.

## IV. The Model Development Process

A. Definition of Zones and Income Components

To develop the income prediction models using the Tampa data set, we first divided the country into four zones, each of which would have its own models. These zones were based loosely on agro-ecological conditions, and on the need to have sufficient sample size in each zone to ensure adequate degrees of freedom for the analysis. The zones and Tampa sample sizes are

- Coastal \& Eastern, 240 households
- Western Lowlands \& Transitional, 343 households
- $\quad$ High potential maize zone, 399 households
- Western \& Central highlands, 410 households

These zones are meant to be representative of the non-marginal agricultural areas of the country; they exclude the northern arid zone and the Marginal Rain Shadow, which together had only 120 households in the Tampa sample.

After defining the four zones for modeling purposes, it was necessary to divide household income into a workable number of meaningful components. Conceptually, income can be

[^4]broken into a very large number of components; the specific components chosen should be a function of their relevance for understanding rural households and the rural economy, and the accuracy with which they can be predicted. For a given level of desired accuracy in the estimate of total income, estimating more income components will require the collection of more proxy variables. At some point, the number of variables collected becomes excessive given the fundamental objective of the proxy approach, which is to reduce the cost of obtaining defensible estimates of household income. The analyst's challenge is to define a set of components which strikes a balance between accuracy, richness of information, and the amount of data collection and processing required.

After considering these issues, and based on a desire for the models to generate insights on the importance of farm vs. off-farm incomes and, within farm income, to highlight differences in incomes from marketing and in-kind incomes from home consumption, we chose eight income components:

1. retained cereals \& tubers
2. sold cereals \& tubers
3. retained fruit \& vegetables
4. sold fruit \& vegetables
5. "industrial" crops (all crops other than cereals \& tubers and fruits \& vegetables)
6. all livestock and livestock products
7. informal off-farm incomes (informal wage labor and microenterprise activities, including jua kali)
8. formal wage labor (salaried labor) \& remittances

Summing the values of the eight components gives total household income. Across the four zones, these eight components required 32 models, which we call the zonal models.
B. Types of Proxy Variables used in the Models

In attempting to estimate each of these components, emphasis was placed on identifying proxy variables that would be straightforward to collect and process, and which had strong logical and empirical links to the level of income from the component. Seven general types of variables were used in the models:

- Measures of the intensity of involvement in the activity. Measures of intensity varied by component, but for the agricultural components typically included the number of items within the category that the household produced (for example, the number of food crops that the household cultivated), and the number of items that it sold (or whether it sold any, or not). For off-farm components, this set of variables generally included the number of people involved in the activity (informal off-farm or salaried labor \& remittances), and the number of months in the year in which someone was involved. This set of variables also included indicators of the specific nature of involvement in the activity (e.g., what general type of wage labor, or what type of informal business activity)
- Production function variables. These were the same for all cropping activities: total acres owned (rather than the more difficult to collect acres in specific crops), use of fertilizers (yes $/ \mathrm{no}$ ), and hiring of labor (yes/no).
- Selected quantitative variables. Quantitative variables are more complex to collect and process than typical proxy variables, but are needed because production levels can fluctuate substantially from year-to-year based on rainfall and other factors. By quantifying the production of the most important food crop and cash crop, these quantities can themselves proxy for yield levels of other crops within their category. This should substantially improve the performance of the method over time. We used five quantitative variables in the models: the quantity produced of the "most important" food crop for home consumption, the quantity produced of the food crop that gave most sales income, the quantity produced of the industrial crop that gave most sales income, the quantity produced of the "most important" fruit or vegetable for home consumption, and the quantity produced of the fruit or vegetable that gave most sales income. By allowing the households to specify their "most important" crop in these various categories and quantifying that, the models should do a good job capturing the effect of changing cropping patterns in rural areas o the country.
- Farmer assessment of the crop harvest. This set of variables includes adverse event variables for the crop production components, such as damage from several sources (yes/no), the number of crops that were completely lost due to any problem, and the farmer's overall assessment of the quality of the year's harvest. These variables will help the models capture year-to-year changes in weather and pest problems.
- Household characteristics, such as schooling of the head of household, whether the household is female-headed, and the estimated value of non-land assets held by the household. ${ }^{6}$
- Household ranking of the relative importance of the income source compared to other sources.
- Interaction terms. We made very liberal use of interaction terms to get maximum value out of the variables used. For example, by interacting the number of months that anyone in the household earned income from any informal off-farm activity (a simple yes/no question) with yes/no indicators of the type of activities that the household was involved in (also yes/no questions), we obtained a proxy for the number of months worked in that specific activity; this variable, and others like it, was quite useful in several of the models.

[^5]Evaluation of the performance of the 32 zonal models revealed that, while they performed quite well predicting income levels from the eight sources in each zone, they substantially underestimated the importance of off-farm incomes for the lowest income households. These models estimated the off-farm income share (the sum of components 7 and 8 ) of the poorest $20 \%$ of households at only $9 \%$, while the actual income data showed the share to be $33 \%$. Given the importance for policy purposes of knowing the relative importance of farm and off-farm incomes for rural households, especially the poorest, we considered this underestimate to be a serious problem. To correct this shortcoming, we chose to use information about expected income levels (from the zonal models) to estimate two conditional models:

1. Re-estimate each of the eight component models by quintile of predicted income from that component (predicted from the zonal models). For example, income from retained cereals and tubers was estimated for each of the five quintiles of predicted income from that source. This procedure generated 40 models (5 quintiles for each of 8 components), and are called the component income quintile models..
2. Re-estimate each of the eight component models by quintile of estimated total per capita income from the zonal models. In this approach, each of the eight components was estimated for each of the five quintiles of predicted total household per capita income. This procedure also gave a total of 40 models, which we refer to as the per capita income quintile models.

We expected these two conditional approaches to help resolve the problem we had identified because they estimate models for groups of households that are relatively homogeneous in terms of incomes (the five quintile groupings based on predicted income levels from the zonal models). If the zonal models predict incomes with substantial accuracy (which they do), then the conditional models are very likely to provide better estimates than the zonal models, as will be seen in the next section.

## V. Model Performance

## A. Internal Performance Evaluation

Our evaluation of the models' performance will focus primarily on checks internal to the Tampa data set - how well the models predict income and income shares as calculated in that data set, and examined from a number of perspectives. Specifically, we will look at four dimensions of performance:

- How well the models predict income levels over space,
- How well they predict income sources nationally,
- How well they predict poverty rates and depth over space,
- How well they perform in tabular analysis by income quintile, and
- How well they perform in multivariate analysis.

In all these internal analyses, the benchmark for comparison will be data as calculated directly from the Tampa data set.

$$
\text { How well do the models predict total income levels over space? }{ }^{7}
$$

Table 2 shows that each of the models explain about $85 \%$ of the variation around the mean nationally and in each of the four zones. The two conditional models perform slightly better in this regard, with most of the improvement coming in the High Potential Maize Zone.

Table 2. Explanatory Power $\left(\mathrm{R}^{2}\right)$ on Total Income, by Zone

| Zone | R-Squared <br> (proportion of total variation in hh income <br> explained by model) |  |  |
| :--- | :---: | :---: | :---: |
|  | Zonal Models | Component <br> Income Quintile <br> Models | Per capita <br> Income Quintile <br> Models |
| Coastal \& Eastern | 0.858 | 0.860 | 0.860 |
| Western Lowlands \& Transitional | 0.890 | 0.874 | 0.885 |
| High potential maize zone | 0.814 | 0.843 | 0.848 |
| Western \& Central highlands | 0.867 | 0.876 | 0.875 |
| National | 0.850 | 0.863 | 0.866 |

Table 3 compares predicted to actual values of mean income for each of the four zones and the 21 districts in the analysis, calculates the errors for each model, and shows the ranking of zones and districts that each model gives. As expected, the zonal models provide more accurate estimates of incomes at the zone level, though errors are small in all three models. All models correctly rank the zones. When examining the results at district level, the second conditional model, based on quintiles of expected per capita income, performs substantially better than the other two, ranking 12 of the 21 districts correctly, and 18 either correctly or within one place. The other two models rank only 7 districts correctly, and have more large errors in both ranking and mean income than the second conditional model.

[^6]Table 3. Mean of Actual and Predicted Incomes, and Income Ranking, by Model, by Zone and District

| Zone/District | Calculated per capita Income |  | Estimated per capita Income |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Level (Ksh) | Rank | Zonal Models |  |  | Component Income Quintile Models |  |  | Per capita Income Quintile Models |  |  |
|  |  |  | Level (Ksh) | \% <br> Error | $\begin{gathered} \text { Ran } \\ \mathbf{k} \end{gathered}$ | Level (Ksh) | $\%$ <br> Error | Rank | Level (Ksh) | \% <br> Error | Rank |
| Coastal \& Eastern | 15,874 | 3 | 15,781 | -0.6\% | 3 | 16,068 | 1.2\% | 3 | 15,475 | $-2.5 \%$ | 3 |
| W. Lowlands \& Trans. | 12,703 | 4 | 12,766 | 0.5\% | 4 | 12,633 | -0.5\% | 4 | 12,801 | 0.8\% | 4 |
| High potential mz zone | 20,647 | 2 | 20,568 | -0.4\% | 2 | 20,540 | -0.5\% | 2 | 20,568 | -0.4\% | 2 |
| W. \& C. Highlands | 23,292 | 1 | 23,490 | 0.9\% | 1 | 23,727 | 1.9\% | 1 | 23,569 | 1.2\% | 1 |
| National | 18,645 |  | 18,681 | 0.2\% |  | 18,760 | 0.6\% |  | 18,660 | 0.1\% |  |
| Siaya | 7,412 | 21 | 8,094 | 9.2\% | 21 | 7,943 | 7.2\% | 21 | 7,620 | 2.8\% | 21 |
| Kisumu | 7,887 | 20 | 7,672 | $-2.7 \%$ | 20 | 7,673 | $-2.7 \%$ | 20 | 7,813 | -0.9\% | 20 |
| Taita Taveta | 8,748 | 19 | 10,491 | 19.9\% | 19 | 11,071 | 26.6\% | 19 | 9,644 | 10.2\% | 19 |
| Kilifi | 10,228 | 18 | 9,277 | $-9.3 \%$ | 15 | 9,918 | -3.0\% | 16 | 10,247 | 0.2\% | 16 |
| Vihiga | 11,575 | 17 | 13,642 | 17.9\% | 17 | 13,681 | 18.2\% | 12 | 12,902 | 11.5\% | 18 |
| Mwingi | 12,748 | 16 | 11,632 | -8.8\% | 16 | 12,193 | -4.4\% | 15 | 12,199 | -4.3\% | 13 |
| Kisii | 12,951 | 15 | 13,356 | $3.1 \%$ | 13 | 14,082 | 8.7\% | 14 | 14,126 | 9.1\% | 15 |
| Kitui | 15,318 | 14 | 13,247 | -13.5\% | 18 | 13,979 | -8.7\% | 18 | 14,910 | $-2.7 \%$ | 17 |
| Kakamega | 16,864 | 13 | 17,026 | 1.0\% | 12 | 16,667 | -1.2\% | 13 | 17,010 | 0.9\% | 14 |
| Trans Nzoia | 17,325 | 12 | 16,419 | -5.2\% | 14 | 17,478 | 0.9\% | 17 | 17,918 | 3.4\% | 12 |
| Muranga | 17,630 | 11 | 18,402 | 4.4\% | 11 | 18,452 | 4.7\% | 11 | 17,362 | -1.5\% | 10 |
| Machakos | 17,973 | 10 | 19,787 | 10.1\% | 9 | 20,861 | 16.1\% | 10 | 17,967 | 0.0\% | 11 |
| Makueni | 18,434 | 9 | 18,458 | 0.1\% | 10 | 19,548 | 6.0\% | 9 | 19,442 | 5.5\% | 9 |
| Bungoma | 19,682 | 8 | 21,612 | 9.8\% | 6 | 21,461 | 9.0\% | 7 | 21,105 | 7.2\% | 8 |
| Kwale | 20,472 | 7 | 19,247 | -6.0\% | 7 | 19,923 | $-2.7 \%$ | 8 | 19,602 | -4.3\% | 7 |
| Nakuru | 20,924 | 6 | 20,519 | -1.9\% | 5 | 20,149 | -3.7\% | 5 | 19,298 | -7.8\% | 5 |
| Uasin Gishu | 21,050 | 5 | 21,493 | 2.1\% | 8 | 19,317 | -8.2\% | 6 | 21,211 | 0.8\% | 6 |
| Narok | 22,456 | 4 | 20,463 | -8.9\% | 3 | 20,599 | -8.3\% | 3 | 21,088 | -6.1\% | 4 |
| Bomet | 30,029 | 3 | 27,645 | -7.9\% | 4 | 26,845 | -10.6\% | 4 | 27,773 | -7.5\% | 3 |
| Nyeri | 31,994 | 2 | 31,167 | $-2.6 \%$ | 1 | 31,081 | $-2.9 \%$ | 1 | 31,104 | -2.8\% | 2 |
| Meru | 36,418 | 1 | 39,487 | 8.4\% | 2 | 38,665 | 6.2\% | 2 | 37,450 | 2.8\% | 1 |

Table 4. Explanatory Power (Pseudo-R ${ }^{2}$ ) on Income Components, National

| Income Component | Zonal Models | Component <br> Income Quintile <br> Models | Per capita <br> Income <br> Quintile <br> Models |
| :--- | :---: | :---: | :---: |
| Retained cereals and tubers | .859 | .848 | .857 |
| Sold cereals and tubers | .928 | .926 | .938 |
| Industrial crops | .976 | .978 | .976 |
| Retained fruits and vegetables | .631 | .651 | .722 |
| Sold fruits and vegetables | .850 | .818 | .858 |
| Livestock | .730 | .748 | .786 |
| Informal off-farm | .592 | .624 | .653 |
| Salaries \& remittance | .749 | .767 | .781 |

How well do the models predict income sources nationally?
From Table 4, we see that the models are most effective predicting income components from sold agricultural production (sold cereals and tubers, industrial crops - nearly all of whose production is sold - and sold fruits and vegetables). The models are least effective with the two off-farm income components, but still predict over $70 \%$ of the variation across the two. Conditional model 2 (with component regressions conditional on expected total per capita income) outperforms the other two models in 7 of the 8 components.

## How well do the models predict rates and depth of poverty?

For this analysis, we used a relative poverty line equal to the $30^{\text {th }}$ percentile in the income distribution, i.e., the bottom $30 \%$ of the sample was defined as poor. ${ }^{8}$ We calculate the headcount index to measure the rate of poverty, and the Thorbecke-Greere poverty gap with $\propto=1$ to measure the depth of poverty. Both are standard indicators used in poverty analysis. All four models rank the zones correctly in terms of headcount index and poverty gap, and accurately reflect the relative differences between zones in these measures (Table 5). There is little to distinguish the models' performance on the headcount index, while the second conditional model performs best in poverty gap analysis, with an error less than or equal to the other two models in every zone.

[^7]Table 5. Income Levels and Poverty Measures by Zone, Actual and Predicted Data

| Zone | Headcount Index |  |  |  | Poverty Gap (alpha=1) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Calculated | Zonal <br> Models | Component Income Quintile Models | Per <br> Capita <br> Income <br> Quintile <br> Models | Calcu- <br> lated | Zonal <br> Models | Component Income Quintile Models | Per <br> Capita <br> Income <br> Quintile <br> Models |
| W. Lowlands \& Transitional | 0.46 | 0.43 | 0.44 | 0.41 | 0.23 | 0.20 | 0.20 | 0.22 |
| Coastal \& Eastern | 0.32 | 0.32 | 0.28 | 0.33 | 0.12 | 0.14 | 0.09 | 0.11 |
| High potential maize zone | 0.24 | 0.19 | 0.19 | 0.20 | 0.10 | 0.08 | 0.08 | 0.08 |
| W. \& C. highlands | 0.21 | 0.21 | 0.16 | 0.19 | 0.09 | 0.11 | 0.07 | 0.07 |

How well do the model results perform in bivariate (tabular) analyses?
To date, there is little to distinguish the models in terms of their performance, with all four predicting very large shares of the variation in household incomes and income components, and performing well also in the headcount index and poverty gap analyses at the zonal level. The differences in performance in the models emerge much more clearly when we use their predicted values to conduct tabular and multivariate analyses. In Table 6 we present examples of tabular analysis that could be done with the original, calculated income levels, and with the predicted income levels from the three models we have specified. For each model, we rank households into quintile of per capita income, then examine income shares, the value of non-land assets, and the amount of cultivated land for each quintile. Note that, in the results for the three models, the value of non-land assets is itself a proxy variable based on a regression of simple yes/no responses to the ownership of a set of 15 assets against the calculated total value of over 40 assets. This variable will be generated directly from the simple proxy data collected in the Phase III survey.

The table shows that all three models perform relatively well estimating income shares in all but the lowest per capita income quintile. In this lowest quintile, the zonal models badly underestimate the share of income from off-farm, estimating this share at $9 \%$ compared to the $33 \%$ share indicated by the actual data. Both conditional models perform much better in this regard, estimating the off-farm share at $34 \%$ and $31 \%$. Given the importance from a policy perspective of knowing with some accuracy the importance of farm vs. off-farm incomes for rural households, we consider the superior performance of the conditional models in this regard to be a key point in their favor.

Table 6. Income Levels and Shares by Source, and Wealth Indicators by per capita Income Quintile, by Calculated and Predicted Income

| Per Capita Income Quintile | Data | Total percapitaIncome (Ksh) | Crop Agriculture |  | Livestock |  | Off-farm |  | Non-land Assets ${ }^{4}$ (Ksh) | Cultivate d Land (ha) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Level <br> (Ksh) | Share | Level (Ksh) | Share | Level <br> (Ksh) | Share |  |  |
| 1 | Actual | 2,962 | 1,614 | 0.54 | 371 | 0.13 | 977 | 0.33 | 53,894 | 3.2 |
|  | From model $1^{1}$ | 2,696 | 1,681 | 0.62 | 785 | 0.29 | 230 | 0.09 | 51,982 | 3.2 |
|  | From model $2^{2}$ | 3,491 | 1,682 | 0.48 | 625 | 0.18 | 1,184 | 0.34 | 62,182 | 3.0 |
|  | From model $3^{3}$ | 3,403 | 1,761 | 0.52 | 602 | 0.18 | 1,040 | 0.31 | 55,295 | 3.3 |
| 2 | Actual | 7,503 | 3,626 | 0.48 | 1,216 | 0.16 | 2,661 | 0.35 | 103,786 | 4.6 |
|  | From model 1 | 8,004 | 3,449 | 0.43 | 1,772 | 0.22 | 2,782 | 0.35 | 109,660 | 4.4 |
|  | From model 2 | 8,217 | 3,467 | 0.42 | 1,547 | 0.19 | 3,203 | 0.39 | 104,654 | 4.6 |
|  | From model 3 | 8,069 | 3,626 | 0.45 | 1,627 | 0.20 | 2,816 | 0.35 | 105,135 | 5.0 |
| 3 | Actual | 13,016 | 5,767 | 0.44 | 2,414 | 0.19 | 4,835 | 0.37 | 105,261 | 4.5 |
|  | From model 1 | 14,091 | 6,256 | 0.44 | 2,613 | 0.19 | 5,222 | 0.37 | 118,297 | 4.9 |
|  | From model 2 | 13,688 | 6,118 | 0.45 | 2,570 | 0.19 | 5,000 | 0.37 | 109,768 | 4.8 |
|  | From model 3 | 13,429 | 5,750 | 0.43 | 2,440 | 0.18 | 5,238 | 0.39 | 115,413 | 4.2 |
| 4 | Actual | 20,828 | 9,545 | 0.46 | 3,506 | 0.17 | 7,776 | 0.37 | 152,723 | 5.5 |
|  | Model 1 | 21,669 | 9,529 | 0.44 | 3,420 | 0.16 | 8,720 | 0.40 | 147,117 | 5.1 |
|  | Model 2 | 21,306 | 9,587 | 0.45 | 3,616 | 0.17 | 8,102 | 0.38 | 140,759 | 5.2 |
|  | Model 3 | 21,204 | 9,834 | 0.46 | 3,891 | 0.18 | 7,478 | 0.35 | 146,960 | 4.9 |
| 5 | Actual | 48,951 | 22,307 | 0.46 | 8,505 | 0.17 | 18,140 | 0.37 | 291,992 | 9.5 |
|  | Model 1 | 46,972 | 22,049 | 0.47 | 7,484 | 0.16 | 17,439 | 0.37 | 265,167 | 9.8 |
|  | Model 2 | 47,124 | 22,036 | 0.47 | 7,767 | 0.16 | 17,322 | 0.37 | 274,937 | 9.7 |
|  | Model 3 | 47,224 | 21,943 | 0.46 | 7,741 | 0.16 | 17,540 | 0.37 | 269,448 | 9.9 |

The superior performance of the conditional models continues in multivariate analyses. Table 7 shows the results of a regression of household per capita income against independent variables which could be considered determinants of those income levels. The regressions with actual data and data from both conditional models show all right hand side variables to be significant and of expected sign; the regression using data from the zonal models shows female-headedness of a household to be insignificant. On most variables, the regression with zonal model data also gives less accurate coefficient estimates. For example, the actual coefficient on $\log$ years of education is 0.016 ; the conditional models each give an estimate of 0.015 , while the zonal models give an estimate of 0.024 , a difference of more than $50 \%$. The same pattern is seen on household size, wage rates in the household's area, and femaleheadedness. Overall, the two conditional models clearly perform better in this multivariate analysis than do the zonal models.

Table 7. Determinants of Household per capita Income, Actual Values Compared to Model-Generated Values (Linear regression results after controlling for village level effects)

| Variable | Actual Data ${ }^{1}$ |  | Proxy Data ${ }^{2}$ |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Zonal Models |  | Component Income Quintile Models |  | Per Capita Income Quintile Models |  |
|  | Coef. | Sig. | Coef. | Sig. | Coef. | Sig. | Coef. | Sig. |
| Constant | 8.173 | 0.000 | 8.470 | 0.000 | 8.667 | 0.000 | 8.540 | 0.000 |
| Log cultivated acres | 0.390 | 0.000 | 0.370 | 0.000 | 0.391 | 0.000 | 0.357 | 0.000 |
| Log years of education, hh head | 0.016 | 0.010 | 0.024 | 0.000 | 0.015 | 0.007 | 0.015 | 0.007 |
| Log hh size | -0.761 | 0.000 | -0.819 | 0.000 | -0.795 | 0.000 | -0.747 | 0.000 |
| Log ag wage rate (per hour) | 0.230 | 0.035 | 0.246 | 0.030 | 0.231 | 0.023 | 0.227 | 0.027 |
| Log value of non-land assets ${ }^{3}$ | 0.187 | 0.000 | 0.174 | 0.000 | 0.145 | 0.000 | 0.157 | 0.000 |
| Female headed hh | -0.194 | 0.007 | -0.058 | 0.442 | -0.173 | 0.010 | -0.154 | 0.024 |
| $\mathrm{R}^{2}$ | 0.460 |  | 0.438 |  | 0.463 |  | 0.447 |  |

${ }^{1}$ Dependent variable $=$ natural log per capita income
${ }^{2}$ Dependent variable $=$ natural $\log$ predicted per capita income
${ }^{3}$ Variable in proxy data models is $\log$ predicted value of non-land assets. All other variables are the same in the two models.

## B. External Performance Evaluation

Table 8 shows a comparison of poverty results from the Tegemeo/MSU data set with those in the 2000 report of the Ministry of Finance and Planning on poverty in Kenya (based on the Welfare Monitoring Surveys - WMS). These results should be interpreted with care for at least two reasons. First, WMS data are household expenditure, while Tegemeo/MSU data are household income. It is generally accepted within the literature that income surveys result in
some degree of underreporting of true income; expenditure is generally thought to be a less sensitive topic and result in more complete reporting. Second, the WMS sample was fully randomized and nationally representative, while Tegemeo/MSU was based on a purposive selection of 24 districts representative of the non-marginal areas of the country.

To create the table, we took the WMS definition of poverty - 1,239 Ksh/month/adult equivalent in 1997 shillings - and adjusted it to 2000 terms based on accumulated inflation of $14 \%$ between the two surveys. We then calculated adult equivalents using the WMS definition, and calculated income per adult equivalent from the Tegemeo/MSU data set. These numbers were then used to classify households as lying above or below the poverty line.

The absolute numbers in the table should be treated with caution for the reasons enumerated above. Nevertheless, the data show that the estimates of poverty from the two data sets are extremely close: the WMS 1997 estimate of the headcount ratio is $52.9 \%$, while the Tegemeo/MSU 2000 estimate, using WMS definitions, is $53.0 \%$. These results suggest that, unless poverty has dramatically increased since 1997, the Tegemeo/MSU income approach resulted in very little underreporting of income.

Aside from any possible undercounting, which here appears to be minor, the patterns in the table - the relationship between income or expenditure and demographic variables - should be less sensitive to the choice of variable. The patterns observed in the two data sets are similar with respect to education of the head of household and age group of the head of household. Patterns diverge, however, with respect to female headedness and size of the household. Tegemeo/MSU data show female headed households having lower incomes than male headed households. This is the common pattern in most African data sets, and contrasts with WMS, which found no significant difference. Tegemeo/MSU data show no consistent relationship between household size and incomes, in contrast to the negative relationship found in the WMS data. In this case, the WMS pattern is most common in other African data sets. These and other relationships between the Tegemeo/MSU and WMS data deserve further analytical attention.

## C. Conclusions from Model Evaluation

The internal evaluation of model results suggests clearly that the two conditional models are superior to the zonal model, both for overall accuracy and especially for their performance in tabular and multivariate analyses which may be done with the data. Among the two conditional models, the second model - conditional on expected total per capita income of the households as predicted from the zonal models - generally outperformed the first conditional model in the analyses presented here, and is therefore the preferred model for future use. There is no significant difference between the models in terms of number of proxy variables and implied data collection burden.

Table 8. Comparison of Relationship Between Headcount Poverty Index and Household Demographic Variables in Welfare Monitoring Survey (WMS) and Tegemeo/MSU Data, Using WMS Definition of Adult Equivalent and Based on Income/AE

| Demographic variable | Welfare Monitoring Survey Data | Tegemeo/MSU Data |  |
| :---: | :---: | :---: | :---: |
|  |  | Calculated income/ae | Predicted income/ae |
|  | ------- | - \% poor | ---- |
| Overall | 52.9 | 54.6 | 53.0 |
| Sex of hh head |  |  |  |
| Male | 52.5 | 52.9 | 51.4 |
| Female | 54.1 | 64.6 | 62.6 |
| Education of hh head |  |  |  |
| None | 64.0 | 71.6 | 68.8 |
| Primary | 53.6 | 59.1 | 58.5 |
| Secondary | 33.4 | 37.4 | 34.7 |
| Post-secondary | 6.8 | 16.7 | 14.1 |
| HH size |  |  |  |
| 1-3 persons | 35.5 | 52.9 | 50.0 |
| 4-6 | 49.6 | 45.0 | 43.1 |
| >6 | 61.7 | 57.8 | 56.4 |
| Age group of hh head |  |  |  |
| 15-29 | 37.9 | 44.8 | 41.4 |
| 30-44 | 49.1 | 45.5 | 42.1 |
| 45-55 | 58.1 | 55.2 | 53.9 |
| >55 | 57.7 | 60.7 | 60.1 |

## VI. Using the Models

Using the models developed in this work to generate estimates of income and our eight income components involves first collecting the simplified proxy data, entering it into a specific data structure, and then running the SPSS/Windows syntax file which converts the proxy data into estimates of household incomes and income components. In practice, the
results generated by the syntax file then need to be critically reviewed to be sure they are reasonable, and underlying proxy variables need to be examined for implausible cases.

Annex B contains the model questionnaire that can be used to collect the needed proxy data. During actual proxy data collection in 2002, additional sections were added to this questionnaire at the request of Tegemeo and MSU. This can be done -- modules or sections can be added -- as long as a) nothing is removed from the model questionnaire and $b$ ) the basic structure of the model questionnaire is not altered. If any sections are removed, it will not be possible to run all the prediction models accurately. If the structure of the questionnaire is altered, the syntax file which generates results will have to be modified to run properly, and these modifications can become complex if substantial changes are made in the questionnaire.

Annex E provides ste-by-step instructions for entering the proxy data, structuring and saving the files, and running the SPSS syntax file to generate results. It is imperative that these procedures be followed closely to avoid substantially increasing the complexity of generating these income proxy results.

# Annex A <br> Cost Comparison, Proxy Vs. Full Income Survey 

Table A1. Indicative Dollar and Time Budget for Full Income Survey of 1,500 Households Compared to Income Proxy Survey of Same Size

| Task | Cost |  | Elapsed <br> Time (weeks) |  | Assumptions/Comments |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Full | Proxy | Full | Proxy |  |
| Questionnaire Design | 2,302 | 307 | 3 | 0.40 | 3 weeks elapsed time for full survey; 2 days for proxy survey (model questionnaire needs only to be reviewed and possibly modified in small ways. |
| Senior analyst | 837 | 112 |  |  | 1 senior analyst $25 \%$ time @ \$4,800/month. |
| Analyst | 907 | 121 |  |  | 1 Analyst 50\% time @ \$2,600/month. |
| Research Assistants | 558 | 74 |  |  | 2 Research Assistants 50\% @ \$800/month. |
| Data collection | 43,362 | 23,412 | 7 | 7.00 | 45 days in the field for full income survey, Same for proxy, but only half as many enumerators. This reduction is based on proxy interview taking only $1 / 4$ as much time, but equal fixed costs of reaching villages and finding households in each village. |
| Enumerator time |  |  |  |  |  |
| Per diem | 21,600 | 10,800 |  |  | 16 enumerators full survey, 8 proxy, @ \$30/day per diem |
| Salaries | 7,200 | 3,600 |  |  | 16 enumerators, 8 proxy, @ \$300/month salary |
| Field supervisor time |  |  |  |  |  |
| Per diem | 5,400 | 2,700 |  |  | 4 field supervisors full survey, 2 proxy @ $\$ 30 /$ day per diem |
| Salaries | 4,800 | 2,400 |  |  | 4 field supervisors full survey, 2 proxy @ $\$ 800 /$ month salary |
| Overall supervisor time (Analyst) |  |  |  |  |  |
| Per diem | 675 | 675 |  |  | 1 overall supervisor $50 \%$ time @ \$30/day per diem both surveys |
| Salaries | 1,887 | 1,887 |  |  | 1 overall supervisor $50 \%$ time @ $\$ 2,600 /$ month salary both surveys |
| Gasoline | 1,800 | 1,350 |  |  | 4 vehicles, 45 days, $100 \mathrm{~km} / \mathrm{day}, 8 \mathrm{~km} / \mathrm{liter}$, $\$ 0.80 / \mathrm{liter}$ for full survey; 3 vehicles for proxy survey |
| Post-coding \& data entry | 4,721 | 1,180 | 3 | 0.75 | 1 week post-coding, 2 weeks data entry for full survey. $75 \%$ less than this for the proxy survey. This figure based on data being approximately $1 / 4$ as much in the proxy survey and no need for post-coding in it. |
| Field supervisor time | 1,488 | 372 |  |  | All 4 supervisors for post-coding, only 2 for data entry supervision. |
| Overall supervisor time (Analyst) | 907 | 227 |  |  | Overall supervisor works half-time on each activity. |
| Data entry personnel | 2,326 | 581 |  |  | 10 DE personnel @ $\$ 500 /$ month for 2 weeks on full survey survey |


| Task | Cost |  | Elapsed <br> Time (weeks) | Assumptions/Comments |  |
| :--- | ---: | ---: | ---: | ---: | :--- |
|  | Full | Proxy | Full | Proxy |  |
| Data cleaning | $\mathbf{1 0 , 4 6 8}$ | $\mathbf{2 , 6 1 7}$ | $\mathbf{6}$ | $\mathbf{1 . 5 0}$ | 4 field supervisors and 1 overall supervisor for six <br> weeks on full survey. 1 Senior Analyst for 2 weeks. <br> $75 \%$ |
| Field supervisor time | 4,465 | 1,116 |  |  |  |
| Overall supervisor for proxy survey <br> time (Analyst) | 3,603 | 901 |  |  |  |
| Senior Analyst | 2,400 | 600 |  |  | Salary \$4,800/month |
| Data Analysis | $\mathbf{2 7 , 0 0 0}$ | $\mathbf{1 , 7 0 9}$ | $\mathbf{1 3}$ | $\mathbf{1 . 0 0}$ | 3 months full survey, 1 week proxy survey |
| Research Assistants | 4,800 |  |  |  | 2 full time RA’s for full. None on proxy |
| Analyst | 7,800 | 600 |  |  | 1 full time Analyst for full and proxy |
| Senior Analyst | 14,400 | 1,109 |  |  | 1 full-time Senior Analyst for full and proxy |
|  |  |  |  |  |  |
| Total | $\mathbf{8 7 , 8 5 3}$ | $\mathbf{2 9 , 2 2 5}$ | $\mathbf{3 2}$ | $\mathbf{1 0 . 6 5}$ | Total cost of proxy survey approximately $1 / 3$ full <br> survey. Total elapsed time approximately 20\% of full <br> survey. |
| Analyst costs | $\mathbf{3 3 , 4 1 6}$ | $\mathbf{6 , 2 3 1}$ |  |  |  |

# Annex B: Income Proxy Questionnaire for Tampa Models 

## Egerton University - Tegemeo Institute/MSU Rural Household Indicators Survey

May, 2002

## Identifying Variables:

Province (Write name, then enter code at far right)
NAME (Please write)

## CODE

District (Write name, then enter code at far right)

| PROV |
| :---: |
| DIST |
| DIV |
| SUBLOC |
| VILL |
| HHID |

HH Name $\qquad$
Respondent Name $\qquad$
Date
$\qquad$
Enumerator (Write name, then enter code at far right)
Is this a Replacement Household (1=yes,2=no)


[^8]"You indicate your voluntary agreement to participate by beginning this interview. Do you have any questions?"
$\qquad$

## AGRICULTURAL ACTIVITIES

Q1. How many TOTAL ACRES did you cultivate (include perennial and annual crops) during the most recent SHORT SEASON?(Eastern Kenya refers to July-Sept 2001 harvest; Western Kenya Nov-Jan 2002 harvest)
Q2. How many TOTAL ACRES did you cultivate (include perennial and annual crops) during the most recent MAIN SEASON?(Eastern Kenya refers to Jan-march 2002 harvest; Western Kenya
RE1

July/October 2001; R.Valley Nov/Dec 2001)

## Q3. CEREALS, TUBERS, AND PULSES

| Crop |  | Did you plant this crop during either main or short harvest? $\begin{aligned} & 1=\text { yes } \\ & 2=\text { no } \end{aligned}$ | Did you apply any fertilizer to this crop during either harvest? $\begin{aligned} & 1=y e s \\ & 2=\text { no } \end{aligned}$ | Did this crop sustain any damage from pests, or weather, or disease, or any other problem? $1=\text { yes }$ $2=n o$ | Did you completely lose this crop from any field during either harvest? $\begin{aligned} & 1=\text { yes } \\ & 2=\text { no } \end{aligned}$ | Did you sell any of this crop over the past 12 months? $\begin{aligned} & 1=y e s \\ & 2=\text { no } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CROP |  | PROD | FERT | DAMAGE | LOSE | SELL |
| Maize | 1 |  |  |  |  |  |
| Green maize | 2 |  |  |  |  |  |
| Beans | 7 |  |  |  |  |  |
| Sorghum | 8 |  |  |  |  |  |
| Millet | 9 |  |  |  |  |  |
| Wheat | 13 |  |  |  |  |  |
| Cowpeas | 21 |  |  |  |  |  |
| Irish potatoes | 27 |  |  |  |  |  |
| Cassava | 28 |  |  |  |  |  |
| Rice | 31 |  |  |  |  |  |
| Groundnuts | 33 |  |  |  |  |  |
| Greengrams | 34 |  |  |  |  |  |
| Sweet potato | 43 |  |  |  |  |  |
| Arrowroots | 44 |  |  |  |  |  |
| Barley | 60 |  |  |  |  |  |
| Yams | 81 |  |  |  |  |  |
| Pigeon peas | 141 |  |  |  |  |  |
| Caster oil | 146 |  |  |  |  |  |
| Njahi | 147 |  |  |  |  |  |
| Soyabeans | 160 |  |  |  |  |  |
| Bulrush millet | 169 |  |  |  |  |  |

Q4. Considering both the short and main harvests, which of these crops gave you the greatest amount of food for home consumption? (WRITE the crop $\qquad$ _)
Q5. Again considering both the short and main harvests, what quantity of this crop (the one listed in the previous question) did you produce over the past year? Quantity
$1=90 \mathrm{~kg}$ bag $\quad 11=50 \mathrm{~kg}$ bag $\quad 2=\mathrm{kgs} \quad 4=$ crates $\quad 5=$ numbers $\quad 12=$ debe
Unit

CASHCTP
Q6. Considering both the short and main harvests, which of these crops gave you the greatest cash income (from sales)? (WRITE the crop or $\mathbf{0}$ if none $\qquad$ _)
$\qquad$
Q7. Again considering both the short and main harvests, what quantity of this crop (the one listed in the previous question) did you produce over the past year?

| $1=90 \mathrm{~kg}$ bag | $11=50 \mathrm{~kg}$ bag | $2=\mathrm{kgs}$ | $4=$ crates |
| :--- | :--- | :--- | :--- |
| $9=$ gorogoro | $10=$ tonnes | $12=$ debe |  |

$\qquad$
$\qquad$
Q8. FRUITS AND VEGETABLES

$\qquad$

| $1=90 \mathrm{~kg}$ bag | $11=50 \mathrm{~kg}$ bag | $2=\mathrm{kgs}$ | $4=$ crates |
| :--- | :--- | :---: | :---: |$\quad$| 5=numbers6=bunches (Bananas) |
| :---: |
| $9=$ gorogoro |$\quad 10=$ tonnes $\quad 12=$ debe $\quad$ Unit

Quantity
it
$\qquad$ _)
Q11. Considering both the short and main harvests, which of these crops gave you the greatest cash income (from sales)? (WRITE the crop or $\mathbf{0}$ if none
Q12. Again considering both the short and main harvests, what quantity of this crop (the one listed in the previous question) did you produce over the past year?

| $1=90 \mathrm{~kg}$ bag | $11=50 \mathrm{~kg}$ bag | $2=\mathrm{kgs}$ |
| :--- | :--- | :--- |
| $9=$ gorogoro | $10=$ tonnes | $12=$ debe |

4=crates $5=$ numbers6=bunches (Bananas)
Unit

QNTCTPF UNITFVF

CASHFV
QNTFVC
UNITFVC $\qquad$ -
Q13. INDUSTRIAL CROPS

| Crop |  | Did you plant/produce this crop during either main or short harvest? $\begin{aligned} & 1=\text { yes } \\ & 2=\text { no } \end{aligned}$ | Did you apply any fertilizer to this crop during either harvest? $\begin{aligned} & 1=y e s \\ & 2=\text { no } \end{aligned}$ | Did this crop sustain any damage from pests, or weather, or disease, or any other problem? 1=yes $2=n o$ | Did you completely lose this crop from any field during either harvest? $\begin{aligned} & 1=\text { yes } \\ & 2=\text { no } \end{aligned}$ | Did you sell any of this crop over the past 12 months? $\begin{aligned} & 1=\text { yes } \\ & 2=\text { no } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CROP |  | PROD | FERT | DAMAGE | LOSE | SELL |
| Cotton | 14 |  |  |  |  |  |
| Fodder | 22 |  |  |  |  |  |
| Pyrethrum | 17 |  |  |  |  |  |
| Sisal | 16 |  |  |  |  |  |
| Sunflower | 30 |  |  |  |  |  |
| Tobacco | 29 |  |  |  |  |  |
| Coffee | 11 |  |  |  |  |  |
| Tea | 12 |  |  |  |  |  |
| Sugarcane (industrial) | 15 |  |  |  |  |  |

CASHIND

QNTINDC UNITINDC

PRODYR

HIRELBR
WAGE

Q19. LIVESTOCK (Reference period is over the past 12 months)

| Animal |  | How many of these animals do you currently <br> own? | Did you sell any of this type of animal over the past 12 <br> months? (1=yes, 2=no) |
| :--- | :--- | :--- | :--- |
| ANIMAL | NANIM | SELLANIM |  |
| Grade cow | 1 |  |  |
| Cross cow | 2 |  |  |
| Local cow | 3 |  |  |
| Grade bull | 4 |  |  |
| Cross bull | 5 |  |  |
| Local bull | 6 |  |  |
| Grade calf | 7 |  |  |
| Cross calf | 8 |  |  |
| Local calf | 9 |  |  |
| Goat | 11 |  |  |
| Sheep | 10 |  |  |
| Chicken | 12 |  |  |
| Duck | 13 |  |  |
| Rabbit | 16 |  |  |

## Q20. LIVESTOCK PRODUCTS

| Livestock Product | Did you produce any of this product over the <br> past 12 months? (1=yes, 2=no) | Did you sell any of this product over the past 12 months? <br> $(\mathbf{1 = y e s , 2 = n o})$ |  |
| :--- | :--- | :---: | :---: |
| ANIMPROD |  |  | NPROD |

$\qquad$

1. Household Members: We'd like to talk to you about all the members you told us about in the last survey in June 2000. (Example)

HHID: $\qquad$

Key variables: PROV, DIST, DIV, LOC, HH, MEM Reference Period: The Last 12 Months

$\qquad$

## Q22. NEW HOUSEHOLD MEMBERS: IF YOU HAVE NEW MEMBERS SINCE THE LAST SURVEY IN JUNE 2000, PLEASE TELL US ABOUT THOSE NEW MEMBERS.



## Q23. OFF-FARM ACTIVITIES

Q.24. Participation in off-farm activities over the past 12 months

| Month <br> Change starting and ending months as appropriate for timing of survey. Last month in list should be last month prior to survey. |  | Did anyone in this household earn income from any kind of business or informal labour activities during the indicated months? (incl jua kali, farm kibaruas, farm other districts) $\text { (1=yes, } 2=n o \text { ) }$ | Did anyone in this household earn income from any kind of salaried employment or remittance during any of the indicated months? $\text { (1=yes, } 2=n o \text { ) }$ |
| :---: | :---: | :---: | :---: |
| MONTH |  | INFMTH | SALMTH |
| May 2001 | 105 |  |  |
| June | 106 |  |  |
| July | 107 |  |  |
| Aug | 108 |  |  |
| Sep | 109 |  |  |
| Oct | 110 |  |  |
| Nov | 111 |  |  |
| Dec | 112 |  |  |
| Jan 2002 | 201 |  |  |
| Feb | 202 |  |  |
| March | 203 |  |  |
| April | 204 |  |  |


| Business and Informal Off-farm Activities |  |  | Salaried Wage Labour |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Activity |  | Over the past 12 months, did anyone in your household engage at any time in any of the following business/informal off-farm activities? ( $1=\mathrm{yes}, 2=\mathrm{no}$ ) | Activity |  | Over the past 12 months, did anyone in your household engage at any time in any of the following salaried wage labour activities? (1=yes, 2=no) |
| ACTINF |  | INFORMAL | ACTSAL |  | SALARIED |
| Informal/Business Activities |  |  | Salaried Employment/Remittance |  |  |
| Farm kibarua | 7 |  | Receive remittances | 12 |  |
| Tout | 36 |  | Teacher | 15 |  |
| Bicycle repair business | 2 |  | Driver | 4 |  |
| Transport business (goods) | 38 |  | Manager | 19 |  |
| Timber trading business | 35 |  | Receive pension income | 10 |  |
| Mining business | 24 |  | Police | 11 |  |
| Jaggery | 18 |  | Shopkeeper/attendant | 24 |  |
| Hawking | 17 |  | Watchman | 17 |  |
| Traditional doctor | 37 |  | Clerk | 3 |  |
| Carpentry business | 6 |  | Sales person | 13 |  |
| Rental properties | 29 |  | General farm worker | 6 |  |
| Driver | 12 |  | Banker/receptionist | 18 |  |
| Local brewing business | 20 |  | Lecturer/tutor | 21 |  |
| Retail shop/kiosk | 30 |  | Civil leader | 20 |  |
| Fish trading business | 15 |  | Chief/Assistant chief | 2 |  |
| Clothes business | 9 |  | Industrial worker | 8 |  |
| Posho mill | 28 |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

$\qquad$

## Q26. HOUSEHOLD ASSETS

| Agricultural asset | Quantity | Agricultural asset | Quantity | Agricultural asset | Quantity |
| :---: | :---: | :---: | :---: | :---: | :---: |
| ITEM | QTY | ITEM | QTY | ITEM | QTY |
| 15=cart |  | 28=radio |  | 40=solar panel |  |
| 18=car |  | 29=zero-grazing units |  | 45=water pump |  |
| 19=truck |  | 33=bore hole |  | 46=telephone |  |
| 21=irrigation equipment |  | 34=motor cycle |  | 50=donkey |  |
| 22=water tank |  |  |  | 51=water trough |  |
| 25=wheel barrow |  |  |  |  |  |

## Q27. IMPORTANCE OF INCOME SOURCES

| Economic Activity |  | Please indicate the order of importance of each of these activities in the household's total income during the past 12 months <br> $-9=$ activity could not be ranked <br> $0=$ did not give any income though produced <br> $1=$ this activity gave the highest income of any activity, <br> 2=this activity gave the second highest income ... <br> ... <br> $-1=$ the household did not engage in this activity <br> Enumerator: First place a $\mathbf{- 1}$ for all activities that the household did not engage in. Then determine which of the remaining activities was the most important, second, etc. |
| :---: | :---: | :---: |
| ECONACT |  | ORDER |
| Crop production and sales (all crops) | 1 |  |
| Livestock production and sales | 2 |  |
| Farm kibarua | 3 |  |
| Non-farm kibarua | 4 |  |
| Salaried labor | 5 |  |
| Business activities | 6 |  |
| Remittance | 7 |  |

Annex C: Enumerator Manual for Proxy Survey

# Enumerator Manual - Income Proxy Section <br> Kenya Rural Household Indicators Survey <br> May, 2002 

## Identifying Variables

A household number is to be assigned by the supervisor.

Date refers to the date the interview is carried out and should be recorded in this format; ddmmyy

## Replacement

Replacement means that the household is totally new and was never interviewed in 1997 or 1998 or 2000. However efforts should be made to locate the original household and replacement should only be done when one reaches a dead end.

Note that a replacement will have a different household identification number.

Replacement will be done only when more than $10 \%$ of the original households in the cluster (village) cannot be interviewed else only the original household should participate. Replacement should be based on the rule of thumb. The agreed approach is to get out of the original household, go to the right without crossing the road, count three households - the forth one becomes a replacement of the original household. If unsuccessful in the fourth household the next household will be interviewed.

A qualified respondent is an adult member of the household preferably over 18 years old who is knowledgeable about household activities including crops and livestock.
A respondent may consult any other member of the household on different items of the questionnaire.

## Definition of main and short seasons

| Seasons | Eastern | Western | R/valley |
| :--- | :--- | :--- | :--- |
| Main | Jan-Mar00, plant Oct | July-Aug99, plant Apr | Nov-Dec99, plant |
| Short | July-Sep99, plant Apr Dec-Jan00, plant Oct | Vegetables, plant Oct |  |

## Paces converted into acres ( $\mathrm{X} * \mathrm{Y}$ )/4800.

## Other conversions

" 8 gogogoros of maize $=1$ Debe
" 40 Gorogoro of maize $=190-\mathrm{kg}$ bag

## AGRICULTURAL ACTIVITIES

Q1/Q2.The focus is on land used. Be sure to include the area under both annual and perennial crops in the estimate of total area. Also include land the household rented in or used under sharecropping arrangements. Do NOT include land that the household owns but did not use due to renting or loaning out

Q3. These questions all require simple yes/no answers. The table applies only to cereals, pulses, and tubers.

- PROD: Answer "yes" if the crop was planted, even if no production was realized. If a crop was not planted during either season, skip down to the next crop in the list.
- FERT: Answer "yes" if any amount of fertilizer was applied to the crop during either short or long seasons.

Q4. This question refers to the crops listed in the Table Q3. First determine which of these crops gave the greatest quantity of food for home consumption. Write the name of the crop in the space provided, then use the codes from Q3 to enter the code on the far-right side.

Q5. Determine the quantity of the crop that was identified in question Q4. Indicate the number of units in QNTCTPF and the type of unit in UNITCTPF. For example, six 50 kg bags would be coded QNTCTPR=6, and UNITCTPF=11.

Q6. This question also refers to the crops listed in Table Q3, but now focuses on which of these gave the greatest quantity for sale, not for home consumption. Fill out Q6 and Q7 with the same procedure used in Q4 and Q5.

Q8. The structure of this table is identical to Table Q3, but it applies to fruits and vegetables. Vegetables are on the left, and fruits on the right.

- PROD: Since fruits are perennials, the question for these crops changes slightly. We want to know if they actually produced the fruit, not if they planted it. So, if they have, for example, an apple tree but produced no fruit from it, answer "no" to PROD for that fruit.

Q9-Q12. These questions are structured in an identical fashion to questions Q4-Q7, but they apply to fruits and vegetables, not to cereals, pulses and tubers.

Q13. This table is identical to Q3, but applies to "industrial" crops rather than to cereals, pulses and tubers.

- PROD: For perennial crops in this list, such as coffee and tea, reply "yes" only if the household produced the crop. If they had trees but did not produce, answer "no". For annual crops such as cotton, answer "yes" as long as they planted, even if they achieved no harvest.

Q14/Q15. These questions focus only on cash income, since these crops are almost entirely sold. They are structured identically to the equivalent questions for cereals/pulses/ tubers (Q6/Q7) and fruits/vegetables (Q11/Q12).

Q16. Ask the respondent to make an overall assessment of the production year, considering both short and main harvests.

Q17. Casual or permanent labor: Be sure to answer "yes" even if only small amounts of labor were hired.

## LIVESTOCK

Q19. Livestock: We want the number of animals they currently own of each type.
Q20. Livestock products: be sure to record an answer of "yes" for NPROD even if only small amounts were produced and even if they were all used for home consumption.

## DEMOGRAPHICS

Q21. This table asks about individual information of individuals who are listed in the 2000 survey, while Table Q22 asks about new household members.*

In Q21, the ID number, name, Age, Sex, and Relationship to head of all members from 2000 will be already printed in the table. Please use this information to identify individuals. Please ask questions about all listed individuals even if some of them do not live with the respondents anymore.

NAME: Please ask if the printed name of this person is correct. If not, please correct the names on the questionnaire. Ask the name of this person if he or she is a new member.

D01: This will have the value 1 already printed, sine all members in this table are from the 2000 survey.

D02: This column asks for current age. It is preceded by a column with no variable name which has printed the age recorded in 2000. Please use the printed age for crosschecking, then update the current age.

D03: Please ask if the printed gender of this person is correct. If not, please cross out the printed gender information, and put the correct information on the questionnaire. Please ask the gender of this person if he or she is a new member.

D04: This question asks the person's relationship with the household head. It is preceded by a column with no variable name which lists the relationship recorded in 2000. Use this printed information for
crosschecking. Note that the codes in this survey are more detailed. Codes are printed at the bottom of the table.

D05: Ask marital status of this individual. There are seven codes, and the codes are in the table. Unmarried children, such as babies, are singles. A wife whose husband has more than one wives is defined as polygamously married even though she has only one husband.

D06: Ask how many months out of the past 12 months this person spent with the household.

D07: Ask if this person is currently in school.
D08: Ask the highest grade completed by this person. Put zero for no schooling. Put 1 for the first grade, 2 for the second grade, and so on. Put 20 if this person has any university education but has not finished. Put 21 if this person has completed a university degree. Put 22 for any post university education.

If this person is currently in school, put the highest completed degree. For instance, if he or she is currently in the third grade, put 2 (the second grade) in D08.

D09: Ask if this person is still a member of this household. If he/she is still a member, skip to D13. If not, go to the next question (D10).

D10: If this person is no longer a member of this household (D09=2), ask for the reason. There are seven codes, printed at the bottom of the table.

If the answer is (4) deceased, go to the next question (D11). If the answer is not (4), skip to D18.

D11: If this person has passed away ( $\mathrm{D} 10=4$ ), ask the cause of his or her death. There are four codes in the table. If it is (4) other, be sure to specify the cause in the questionnaire.

D12: If this person has passed away ( $\mathrm{D} 10=4$ ), ask in which year the person passed away. Please put the year in four digits, such as 2000. Please do not put two digits, such as 99 . Skip the next question and go to D14.

D13: You will ask this person only if the person is still a member of this household (D09=1). Ask if he/she has been ill for at least the past month (continuously). (We are interested in finding individuals who have been chronically ill, which will be determined by the next four questions.)

D14-17: If this person has passed away ( $\mathrm{D} 10=4$ ) or has been ill ( $\mathrm{D} 13=1$ ), please ask the following four questions about the death or illness. Put either 1 or 2 , do not leave these question blank. These questions should only be
left blank if this person passed way but not due to disease $D 10=4$ but D11 is not equal to 1 ), or if the person has not been sick (D13=2).

D18: Indicate if the person was involved in any business or informal labour activities during the preceding 12 months. Be sure to record "yes" even if the involvement was short term (e.g., during only 1 or 2 months).

D19: Ask if the person was involved in any salaried employment during any of the past 12 months.

Q22. New Members. The structure of this table is identical to Q21, except it has no data from 2000 because it is meant ONLY for NEW MEMBERS. Note that D01 is already filled with a value of 2 , to indicate new member.

A new household member is a person who joined the household after the 2000 survey. A new member may have (a) married one of the household members, (b) moved away prior to the 2000 survey but came back, (c) been adopted permanently or being fostered temporarily, or (d) been simply missed in the 2000 survey.

Note: A new member who joined the household since the 2000 survey (June 2000) but has passed away or moved away prior to your visit SHOULD STILL BE INCLUDED in this table.

## OFF-FARM ACTIVITIES

Q24. Questions D18 and D19 from the two demography tables provide a partial guide for Q24: if anyone replied "yes" to D18 or D19 in either of the Demography tables, then Q24 should be completed. Q18 corresponds to INFMTH, and Q19 corresponds to SALMTH.

We wish to get a sense of the seasonality of the off-farm activities and how continuous they are. Be sure to record "yes" if ANYONE in the household earned ANY MONEY OR IN-KIND INCOME from these activities during the indicated month.

Q25. Indicate "yes" for the indicated activity if anyone was involved in that activity at any point during the past 12 months. Note that the list of activities in Q25 is not exhaustive. Thus, it is possible that a household had off-farm income, thus positive answers to Q18 or Q19 in the demography tables, and some positive answers to INFMTH or SALMTH in Q24, and they could still have all answers of "no" in Q25.

Q26 Household Assets: This table is also not exhaustive. Just indicate the quantity of each listed asset that the household has.

Q27. Please rank the importance of the listed income sources to the household's total CASH income.

- First indicate with a - 1 those activities that the household did not engage in.
- Then indicate with a 0 (zero) those activities that the household engaged in but which gave no cash income.
- Then rank the remaining activities with 1 (most important), 2 (second most important), etc.
- If, for some reason, an activity cannot be ranked, use -9 . Be sure NOT to use -9 when -1 or 0 are appropriate.

Annex D: Full Model Results

## ZONAL MODELS

A. Retained Cereals and Tubers, Zonal Models

## Zone 1

Model

| R | R Square | Adjusted R <br> Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.974(\mathrm{a})$ | .948 | .943 | 9157.07137 |  |

a Predictors: (Constant), PPEARET, NCTP number of ctp produced, PVASST02 Unstandardized Predicted Value, QKEYRBE qkeyret interacted with beans, QKEYRCOW qkeyret interacted with cowpeas, QKEYRGRM qkeyret interacted with green maize, QKEYRCA qkeyret interacted with cassava, QKEYRIP qkeyret interacted with irishpotatoes, QKEYRET quant of prodn of key retained crop based on quantity retained approach, STPOTRET, NSOLD number of ctp sold, QKEYRPIP qkeyret interacted with pigeon peas, TACRES total acres cultivated, COWPRET, BNSRET, LBRAREA hlbryes interacted w/ tacres, NDAMAGE number of ctp damaged, DMGQRET ndamage interacted w/ qkeyret, NSLDQRET nsold interacted $w /$ qkeyret, LBRQRET hlbryes interacted $w /$ qkeyret, NCTPQRET nctp interacted w/ qkeyret
b Dependent Variable: VRETNET

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (Constant) | -3379.206 | 2089.807 |  | -1.617 | . 107 |
| NCTP number of ctp produced | 1832.629 | 276.175 | . 219 | 6.636 | . 000 |
| NCTPQRET nctp interacted w/ qkeyret | -1.972 | . 328 | -. 979 | -6.020 | . 000 |
| NSLDQRET nsold interacted w/ qkeyret | -1.737 | . 390 | -. 306 | -4.449 | . 000 |
| NSOLD number of ctp sold | 1304.028 | 464.302 | . 072 | 2.809 | . 005 |
| PVASST02 Unstandardized Predicted | -. 018 | . 003 | -. 101 | -5.534 | . 000 |
| Value |  |  |  |  |  |
| TACRES total acres cultivated | 678.995 | 114.868 | . 164 | 5.911 | . 000 |
| DMGQRET ndamage interacted w/ qkeyret | 1.563 | . 271 | . 500 | 5.757 | . 000 |
| NDAMAGE number of ctp damaged | -1304.166 | 245.489 | -. 166 | -5.313 | . 000 |
| LBRQRET hlbryes interacted w/ qkeyret | 3.888 | 1.732 | . 205 | 2.245 | . 026 |
| LBRAREA hlbryes interacted w/ tacres | -629.611 | 168.696 | -. 122 | -3.732 | . 000 |
| QKEYRET quant of prodn of key retained crop based on quantity retained approach | 26.798 | 2.195 | 1.401 | 12.206 | . 000 |
| QKEYRGRM qkeyret interacted with green maize | -9.793 | 3.696 | -. 044 | -2.649 | . 009 |
| QKEYRBE qkeyret interacted with beans | -18.705 | 3.906 | -. 107 | -4.789 | . 000 |
| BNSRET | 6280.172 | 3404.531 | . 039 | 1.845 | . 067 |
| QKEYRCOW qkeyret interacted with cowpeas | 6.715 | 1.835 | . 084 | 3.658 | . 000 |
| COWPRET | -9024.582 | 3202.283 | -. 057 | -2.818 | . 005 |
| QKEYRIP qkeyret interacted with irishpotatoes | -9.795 | 6.730 | -. 024 | -1.455 | . 147 |
| QKEYRCA qkeyret interacted with cassava | -8.273 | 1.881 | -. 078 | -4.398 | . 000 |
| STPOTRET | -5258.812 | 1867.295 | -. 050 | -2.816 | . 005 |
| QKEYRPIP qkeyret interacted with pigeon peas | 10.021 | 1.087 | . 215 | 9.217 | . 000 |
| PPEARET | -9703.459 | 3092.518 | -. 057 | -3.138 | . 002 |

a Dependent Variable: VRETNET

## Retained Cereals and Tubers, Zonal Models

## Zone 2

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.846(\mathrm{a})$ | .715 | .701 | 6010.46414 |  |

a Predictors: (Constant), STPOTRET, FEMHEAD female headed hh, LBRAREA hlbryes interacted $w /$ tacres, COWPRET, PRODYEAR Farmer's view about production year 1999/2000, NCTP number of ctp produced, PVASST02 Unstandardized Predicted Value, ORDCOMP order interacted with ecompare, DMGQRET ndamage interacted $w /$ qkeyret, FERTQRET fertyes interacted w/ qkeyret, QKEYRSTP qkeyret interacted with sweetpotatoes, NSLDQRET nsold interacted w/ qkeyret, FERTAREA fertyes interacted w/tacres, LBRQRET hlbryes interacted w/ qkeyret, NCTPQRET nctp interacted w/ qkeyret, QKEYRET quant of prodn of key retained crop based on quantity retained approach
b Dependent Variable: VRETNET

|  | B | Std. Error | Beta | t | sig |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (Constant) | -189.632 | 1591.805 |  | -. 119 | . 905 |
| NCTP number of ctp produced | 165.851 | 138.819 | . 049 | 1.195 | . 233 |
| NCTPQRET nctp interacted w/ qkeyret | 1.472 | . 180 | . 889 | 8.157 | . 000 |
| NSLDQRET nsold interacted w/ qkeyret | -. 746 | . 153 | -. 317 | -4.872 | . 000 |
| ORDCOMP order interacted with ecompare | 126.530 | 95.087 | . 045 | 1.331 | . 184 |
| PVASST02 Unstandardized Predicted Value | -. 006 | . 004 | -. 049 | -1.457 | . 146 |
| FEMHEAD female headed hh | -3555.994 | 847.162 | -. 128 | -4.198 | . 000 |
| DMGQRET ndamage interacted w/ qkeyret | -. 833 | . 137 | -. 303 | -6.063 | . 000 |
| PRODYEAR Farmer's view about production year 1999/2000 | 1164.760 | 396.988 | . 091 | 2.934 | . 004 |
| FERTQRET fertyes interacted w/ qkeyret | -5.729 | 1.094 | -. 480 | -5.237 | . 000 |
| FERTAREA fertyes interacted w/ tacres | 716.102 | 179.316 | . 271 | 3.994 | . 000 |
| LBRQRET hlbryes interacted w/ qkeyret | -2.467 | . 882 | -. 194 | -2.796 | . 005 |
| LBRAREA hlbryes interacted w/ tacres | -438.402 | 166.928 | -. 169 | -2.626 | . 009 |
| QKEYRET quant of prodn of key retained crop based on quantity retained approach | 9.146 | 1.501 | . 755 | 6.093 | . 000 |
| COWPRET | 2530.763 | 2225.443 | . 035 | 1.137 | . 256 |
| QKEYRSTP qkeyret interacted with sweetpotatoes | 2.821 | 1.322 | . 090 | 2.133 | . 034 |
| STPOTRET | -3121.425 | 1162.950 | -. 113 | -2.684 | . 008 |

a Dependent Variable: VRETNET

## Retained Cereals and Tubers, Zonal Models

## Zone 3

| $R$ | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.788(\mathrm{a})$ | .622 | .607 | 9910.41311 |  |

a Predictors: (Constant), STPOTRET, PRODYEAR Farmer's view about production year 1999/2000, SCH HEAD years of schooling for hh head, DMGQRET ndamage interacted w/ qkeyret, NCTP number of ctp produced, HHSIZE hh size, ORDCOMP order interacted with ecompare, NDAMAGE number of ctp damaged, LBRQRET hlbryes interacted w/ qkeyret, NSOLD number of ctp sold, QKEYRSTP qkeyret interacted with sweetpotatoes, NSLDQRET nsold interacted w/ qkeyret, QKEYRET quant of prodn of key retained crop based on quantity retained approach, NCTPQRET nctp interacted w/ qkeyret
b Dependent Variable: VRETNET

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (Constant) | -1481.256 | 2528.826 |  | -. 586 | . 558 |
| NCTP number of ctp produced | 873.584 | 385.274 | . 110 | 2.267 | . 024 |
| NCTPQRET nctp interacted w/ qkeyret | . 170 | . 089 | . 285 | 1.920 | . 056 |
| NSLDQRET nsold interacted w/ qkeyret | -. 304 | . 103 | -. 339 | -2.949 | . 003 |
| NSOLD number of ctp sold | 1274.803 | 418.358 | . 147 | 3.047 | . 002 |
| ORDCOMP order interacted with ecompare | 465.629 | 133.971 | . 127 | 3.476 | . 001 |
| HHSIZE hh size | 442.571 | 163.602 | . 090 | 2.705 | . 007 |
| SCH_HEAD years of schooling for hh head | -284.154 | 112.238 | -. 084 | -2.532 | . 012 |
| DMGQRET ndamage interacted w/ qkeyret | . 176 | . 056 | . 150 | 3.136 | . 002 |
| NDAMAGE number of ctp damaged | -1529.121 | 312.577 | -. 198 | -4.892 | . 000 |
| PRODYEAR Farmer's view about production year 1999/2000 | 3.554 | 1.550 | . 075 | 2.293 | . 022 |
| LBRQRET hlbryes interacted w/ qkeyret | -2.488 | . 288 | -. 681 | -8.631 | . 000 |
| QKEYRET quant of prodn of key retained crop based on quantity retained approach | 3.899 | . 491 | 1.084 | 7.943 | . 000 |
| QKEYRSTP qkeyret interacted with sweetpotatoes | 9.643 | 3.232 | . 130 | 2.983 | . 003 |
| STPOTRET | -7731.352 | 3061.825 | -. 111 | -2.525 | . 012 |

a Dependent Variable: VRETNET

## Retained Cereals and Tubers, Zonal Models

## Zone 4

| R | R Square | Adjusted <br> R Square | Std. Error <br> of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.903(\mathrm{a})$ | .816 | .809 | 8317.2317 <br> 6 |  |

a Predictors: (Constant), QKEYRSTP qkeyret interacted with sweetpotatoes, NCTP number of ctp produced, SCH_HEAD years of schooling for hh head, IRPOTRET, ORDCOMP order interacted with ecompare, FEMHEAD female headed hh, NDAMAGE number of ctp damaged, DMGQRET ndamage interacted w/ qkeyret, QKEYRIP qkeyret interacted with irishpotatoes, ZEROQRET nzerohrv interacted w/ qkeyret, NSLDQRET nsold interacted $w /$ qkeyret, NCTPQRET nctp interacted $w /$ qkeyret, QKEYRET quant of prodn of key retained crop based on quantity retained approach b Dependent Variable: VRETNET

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -1265.125 | 1877.693 |  | -.674 | .501 |
| NCTP number of ctp produced | 926.082 | 169.384 | .144 | 5.467 | .000 |
| NCTPQRET nctp interacted w/ qkeyret | .262 | .102 | .341 | 2.572 | .010 |
| NSLDQRET nsold interacted w/ qkeyret | -.888 | .138 | -.607 | -6.417 | .000 |
| ORDCOMP order interacted with ecompare | 205.426 | 109.241 | .042 | 1.880 | .061 |
| SCH_HEAD years of schooling for hh head | -47.960 | 102.868 | -.011 | -.466 | .641 |
| FEMHEAD female headed hh | -2610.379 | 1208.330 | -.049 | -2.160 | .031 |
| DMGQRET ndamage interacted w/ qkeyret | .787 | .112 | .396 | 7.003 | .000 |
| NDAMAGE number of ctp damaged | -550.916 | 194.506 | -.077 | -2.832 | .005 |
| ZEROQRET nzerohrv interacted w/ qkeyret | -1.325 | .193 | -.347 | -6.853 | .000 |
| QKEYRET quant of prodn of key retained crop | 9.707 | .978 | 1.413 | 9.923 | .000 |
| based on quantity retained approach |  |  |  |  |  |
| QKEYRIP qkeyret interacted with irishpotatoes | -9.178 | .721 | -.741 | -12.728 | .000 |
| IRPOTRET | 3637.686 | 1157.375 | .088 | 3.143 | .002 |
| QKEYRSTP qkeyret interacted with | -.798 | .613 | -.096 | -1.301 | .194 |
| Sweetpotatoes |  |  |  |  |  |

a Dependent Variable: VRETNET

## B. Sold Cereals and Tubers, Zonal Models

## Zone 1

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.980(\mathrm{a})$ | .961 | .955 | 5171.44035 |  |

a Predictors: (Constant), ARROWSLD, LBRAREA hlbryes interacted $\mathrm{w} /$ tacres, NCTP number of ctp produced, CASSSLD, FERTAREA fertyes interacted $\mathrm{w} /$ tacres, NSOLD number of ctp sold, QKEYSCA qkeysold interacted with cassava, QKEYSOLD quant of prodn of key sales crop based on value sold approach, NDAMAGE number of ctp damaged, QKEYSARR qkeysold interacted with arrow roots, DMGQSLD, NSLDQSLD, NCTPQSLD
b Dependent Variable: VSOLDNET

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | 2204.811 | 2047.101 |  | 1.077 | .284 |
| NCTP number of ctp produced | 423.088 | 232.614 | .071 | 1.819 | .072 |
| NCTPQSLD | -1.382 | .262 | -1.225 | -5.277 | .000 |
| NSLDQSLD | 2.036 | .237 | .905 | 8.581 | .000 |
| NSOLD number of ctp sold | 1224.059 | 340.552 | .117 | 3.594 | .001 |
| DMGQSLD | 1.229 | .283 | .671 | 4.345 | .000 |
| NDAMAGE number of ctp damaged | -849.570 | 194.028 | -.165 | -4.379 | .000 |
| FERTAREA fertyes interacted w/ tacres | 363.418 | 131.988 | .064 | 2.753 | .007 |
| LBRAREA hlbryes interacted w/ tacres | 439.595 | 106.115 | .127 | 4.143 | .000 |
| QKEYSOLD quant of prodn of key sales crop | 1.621 | 1.086 | .151 | 1.492 | .139 |
| based on value sold approach |  |  |  |  |  |
| QKEYSCA qkeysold interacted with cassava | 6.375 | 1.570 | .321 | 4.062 | .000 |
| CASSSLD | -7119.331 | 1920.778 | -.106 | -3.706 | .000 |
| QKEYSARR qkeysold interacted with arrow | 9.316 | 5.065 | .064 | 1.839 | .069 |
| roots |  |  |  |  |  |
| ARROWSLD | -6379.386 | 3609.917 | -.061 | -1.767 | 0.08 |

[^9]Sold Cereals and Tubers, Zonal Models

Zone 2

## Model Summary(b)

Model

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.907(\mathrm{a})$ | .822 | .811 | 4922.73999 |  |

a Predictors: (Constant), QKEYSSOY qkeysold interacted with soybeans, QKEYSMI qkeysold interacted with millet, QKEYSBE qkeysold interacted with beans, QKEYSCA qkeysold interacted with cassava, QKEYSGNT qkeysold interacted with groundnuts, QKEYSRI qkeysold interacted with rice, PRODYEAR Farmer's view about production year 1999/2000, NSLDQSLD, FEMHEAD female headed hh, ZEROQSLD, NSOLD number of ctp sold, LBRQSLD, NCTPQSLD
b Dependent Variable: VSOLDNET

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (Constant) | -1571.008 | 955.457 |  | -1.644 | . 102 |
| NCTPQSLD | . 223 | . 080 | . 164 | 2.787 | . 006 |
| NSLDQSLD | 1.016 | . 145 | . 465 | 7.014 | . 000 |
| NSOLD number of ctp sold | 541.481 | 194.432 | . 098 | 2.785 | . 006 |
| FEMHEAD female headed hh | -1575.953 | 903.286 | -. 054 | -1.745 | . 083 |
| ZEROQSLD | -. 531 | . 155 | -. 108 | -3.420 | . 001 |
| PRODYEAR Farmer's view about production year 1999/2000 | 738.015 | 402.520 | . 055 | 1.833 | . 068 |
| LBRQSLD | 1.450 | . 523 | . 129 | 2.773 | . 006 |
| QKEYSBE qkeysold interacted with beans | 13.900 | 1.849 | . 225 | 7.516 | . 000 |
| QKEYSMI qkeysold interacted with millet | 17.101 | 2.337 | . 217 | 7.317 | . 000 |
| QKEYSCA qkeysold interacted with cassava | -3.818 | 1.131 | -. 117 | -3.374 | . 001 |
| QKEYSRI qkeysold interacted with rice | 8.150 | . 782 | . 377 | 10.416 | . 000 |
| QKEYSGNT qkeysold interacted with groundnuts | 18.574 | 4.612 | . 118 | 4.027 | . 000 |
| QKEYSSOY qkeysold interacted with soybeans | 40.540 | 15.638 | . 076 | 2.592 | . 010 |

Sold Cereals and Tubers, Zonal Models

## Zone 3

## Model Summary(b)

Model

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.955(\mathrm{a})$ | .911 | .908 | 20105.35349 |  |

a Predictors: (Constant), BARSLD, QKEYSWH qkeysold interacted with wheat, ORDCOMP order interacted with ecompare, NDAMAGE number of ctp damaged, NCTPQSLD, DMGQSLD, QKEYSBAR qkeysold interacted with barley, FERTQSLD, NSLDQSLD, QKEYSOLD quant of prodn of key sales crop based on value sold approach
b Dependent Variable: VSOLDNET

Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -7564.314 | 3970.065 |  | -1.905 | .058 |
| NCTPQSLD | -.479 | .140 | -.223 | -3.434 | .001 |
| NSLDQSLD | 2.232 | .169 | .703 | 13.222 | .000 |
| ORDCOMP order interacted with ecompare | 477.085 | 307.919 | .030 | 1.549 | .122 |
| DMGQSLD | -.260 | .135 | -.063 | -1.928 | .055 |
| NDAMAGE number of ctp damaged | 960.086 | 716.152 | .030 | 1.341 | .181 |
| FERTQSLD | -2.567 | 1.101 | -.205 | -2.332 | .020 |
| QKEYSOLD quant of prodn of key sales | 7.258 | 1.314 | .575 | 5.523 | .000 |
| crop based on value sold approach |  |  |  |  |  |
| QKEYSWH qkeysold interacted with wheat | 6.362 | .623 | .265 | 10.208 | .000 |
| QKEYSBAR qkeysold interacted with barley | -9.451 | 3.760 | -.110 | -2.514 | .012 |
| BARSLD | 70527.558 | 28633.438 | .107 | 2.463 | .014 |

Sold Cereals and Tubers, Zonal Models

## Zone 4

Model

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | :---: | :---: |
| $.960(a)$ | .921 | .915 | 7049.62596 |  |

Predictors: (Constant), QKEYSSTP qkeysold interacted with sweetpotatoes, NCTPQSLD, QKEYSGNT qkeysold interacted with groundnuts, FERTYES Used fertilizer, NZEROHRV \# of crops w/ failed harvest, NADULT \# of adults in hh, BNSSLD, QKEYSGRM qkeysold interacted with green maize, PRODYEAR Farmer's view about production year 1999/2000, TACRES total acres cultivated, NSOLD number of ctp sold, IRPOTSLD, ZEROQSLD, LBRQSLD, NSLDQSLD, QKEYSOLD quant of prodn of key sales crop based on value sold approach, FERTAREA fertyes interacted w/ tacres
b Dependent Variable: VSOLDNET

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (Constant) | 4872.503 | 4987.387 |  | . 977 | . 330 |
| NCTPQSLD | -. 211 | . 076 | -. 219 | -2.774 | . 006 |
| NSLDQSLD | . 359 | . 115 | . 206 | 3.123 | . 002 |
| NSOLD number of ctp sold | 1442.697 | 287.768 | . 119 | 5.013 | . 000 |
| NADULT \# of adults in hh | -115.505 | 174.816 | -. 014 | -. 661 | . 510 |
| TACRES total acres cultivated | -2484.852 | 1444.192 | -. 469 | -1.721 | . 087 |
| PRODYEAR Farmer's view about production year 1999/2000 | 1318.536 | 752.125 | . 036 | 1.753 | . 081 |
| ZEROQSLD | -. 661 | . 228 | -. 079 | -2.897 | . 004 |
| NZEROHRV \# of crops w/ failed harvest | 500.609 | 296.141 | . 044 | 1.690 | . 092 |
| FERTAREA fertyes interacted w/ tacres | 2804.655 | 1447.441 | . 535 | 1.938 | . 054 |
| FERTYES Used fertilizer | -12198.726 | 4669.168 | -. 093 | -2.613 | . 010 |
| LBRQSLD | -1.233 | . 387 | -. 114 | -3.184 | . 002 |
| QKEYSOLD quant of prodn of key sales crop based on value sold approach | 9.920 | . 808 | 1.022 | 12.270 | . 000 |
| QKEYSGRM qkeysold interacted with green maize | 5.459 | 1.037 | . 111 | 5.267 | . 000 |
| BNSSLD | 3806.091 | 1485.285 | . 052 | 2.563 | . 011 |
| IRPOTSLD | -3722.789 | 1255.410 | -. 070 | -2.965 | . 003 |
| QKEYSGNT qkeysold interacted with groundnuts | 52.678 | 7.828 | . 136 | 6.729 | . 000 |
| QKEYSSTP qkeysold interacted with sweetpotatoes | -4.398 | 1.596 | -. 058 | -2.756 | . 006 |

a Dependent Variable: VSOLDNET

## C. Retained Fruit \& Vegetable, Zonal Models

## Zone 1

## Model Summary(b)

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.796(\mathrm{a})$ | .634 | .611 | 11351.67700 |  |

a Predictors: (Constant), QKEYRCP qkeyret interacted w/ cowplvs, QKEYRTO qkeyret interacted w/ tomato, QKEYRGV qkeyret interacted w/ guava, QKEYRCB qkeyret interacted w/ cabbage, QKEYROR qkeyret interacted w/ orange, QKEYRSC qkeyret interacted w/ chewcane, NZEROHRV, QKEYRET quant of prodn of key retained crop based on quantity retained approach, ORDCOMP order interacted with ecompare, NFV number of f\&v produced, LBRAREA, LBRQRET hlbryes interacted w/ qkeyret, CBBGRET, NSLDQRET nsold interacted w/ qkeyret
b Dependent Variable: VRETNET

Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -9275.619 | 2631.670 |  | -3.525 | .001 |
| NFV number of f\&v produced | 1389.510 | 192.928 | .348 | 7.202 | .000 |
| NSLDQRET nsold interacted w/ qkeyret | .053 | .033 | .154 | 1.640 | .102 |
| ORDCOMP order interacted with ecompare | 300.560 | 206.179 | .064 | 1.458 | .146 |
| NZEROHRV | 212.514 | 149.495 | .060 | 1.422 | .157 |
| LBRQRET hlbryes interacted w/ qkeyret | -1.638 | .326 | -.289 | -5.028 | .000 |
| LBRAREA | 925.403 | 379.214 | .134 | 2.440 | .015 |
| QKEYRET quant of prodn of key retained crop | 1.346 | .336 | .407 | 4.002 | .000 |
| based on quantity retained approach |  |  |  |  |  |
| QKEYRTO qkeyret interacted w/ tomato | 2.605 | .803 | .150 | 3.243 | .001 |
| QKEYRSC qkeyret interacted w/ chewcane | 1.952 | 1.425 | .057 | 1.370 | .172 |
| QKEYRCB qkeyret interacted w/ cabbage | 6.763 | 3.619 | .122 | 1.869 | .063 |
| CBBGRET | -13530.929 | 7524.846 | -.119 | -1.798 | .074 |
| QKEYRGV qkeyret interacted w/ guava | 6.945 | 1.870 | .154 | 3.713 | .000 |
| QKEYROR qkeyret interacted w/ orange | 6.298 | 1.623 | .168 | 3.881 | .000 |
| QKEYRCP qkeyret interacted w/ cowplvs | 12.356 | 6.725 | .076 | 1.837 | .068 |

a Dependent Variable: VRETNET

## Retained Fruit \& Vegetable, Zonal Models

Zone 2

## Model Summary(b)

| $R$ | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :--- |
| $.781(\mathrm{a})$ | .610 | .586 | 5928.82479 |  |

a Predictors: (Constant), QKEYRIV qkeyret interacted w/ indigveg, NSOLD number of f\&v sold, QKEYROR qkeyret interacted w/ orange, QKEYRGV qkeyret interacted w/ guava, QKEYRPP qkeyret interacted w/ pawpaw, QKEYRMG qkeyret interacted w/mango, PUMPRET, QKEYRON qkeyret interacted w/ onions, QKEYRSU qkeyret interacted w/ sukuma, QKEYRCP qkeyret interacted w/ cowplvs, NDAMAGE number of f\&v damaged, QKEYRTO qkeyret interacted w/ tomato, ORDCOMP order interacted with ecompare, QKEYRAV qkeyret interacted w/ avocado, QKEYRCB qkeyret interacted w/ cabbage, NFV number of f\&v produced, FERTQRET fertyes interacted w/ qkeyret, QKEYRET quant of prodn of key retained crop based on quantity retained approach
b Dependent Variable: VRETNET

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -1522.903 | 1224.147 |  | -1.244 | .214 |
| NFV number of f\&v produced | 1166.014 | 193.124 | .331 | 6.038 | .000 |
| NSOLD number of f\&v sold | -867.899 | 219.675 | -.214 | -3.951 | .000 |
| ORDCOMP order interacted with ecompare | 115.536 | 91.478 | .048 | 1.263 | .208 |
| NDAMAGE number of f\&v damaged | -438.655 | 175.459 | -.097 | -2.500 | .013 |
| FERTQRET fertyes interacted w/ qkeyret | -3.973 | 1.390 | -.273 | -2.858 | .005 |
| QKEYRET quant of prodn of key retained crop | 20.303 | 1.492 | 3.199 | 13.610 | .000 |
| based on quantity retained approach |  |  |  |  |  |
| QKEYRTO qkeyret interacted w/ tomato | -13.588 | 1.225 | -.583 | -11.089 | .000 |
| QKEYRSU qkeyret interacted w/ sukuma | -14.588 | 1.581 | -.398 | -9.225 | .000 |
| PUMPRET | -2571.515 | 1713.786 | -.056 | -1.500 | .135 |
| QKEYRMG qkeyret interacted w/ mango | -19.540 | 1.494 | -2.890 | -13.078 | .000 |
| QKEYRAV qkeyret interacted w/ avocado | -11.660 | 2.406 | -.195 | -4.847 | .000 |
| QKEYRCB qkeyret interacted w/ cabbage | -10.510 | 2.116 | -.202 | -4.966 | .000 |
| QKEYRPP qkeyret interacted w/ pawpaw | -15.312 | 2.198 | -.318 | -6.967 | .000 |
| QKEYRGV qkeyret interacted w/ guava | -16.849 | 2.330 | -.292 | -7.230 | .000 |
| QKEYROR qkeyret interacted w/ orange | -16.790 | 2.369 | -.309 | -7.087 | .000 |
| QKEYRCP qkeyret interacted w/ cowplvs | -22.657 | 7.586 | -.112 | -2.987 | .003 |
| QKEYRON qkeyret interacted w/ onions | -16.189 | 2.198 | -.295 | -7.366 | .000 |
| QKEYRIV qkeyret interacted w/ indigveg | -17.776 | 4.085 | -.171 | -4.352 | .000 |

a Dependent Variable: VRETNET

## Zone 3

## Model Summary(b)

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.826(\mathrm{a})$ | .683 | .664 | 5043.12342 |  |

a Predictors: (Constant), QKEYRIV qkeyret interacted w/ indigveg, QKEYRET quant of prodn of key retained crop based on quantity retained approach, QKEYRPP qkeyret interacted w/ pawpaw, QKEYRCP qkeyret interacted w/ cowplvs, QKEYRGV qkeyret interacted w/ guava, QKEYRAV qkeyret interacted w/ avocado, FEMHEAD female headed hh, QKEYROR qkeyret interacted w/ orange, NZEROHRV, QKEYRPU qkeyret interacted w/ pumpkin, QKEYRSU qkeyret interacted w/ sukuma, HLBRYES used hired labour, QKEYRCB qkeyret interacted w/ cabbage, NFV number of f\&v produced, NDAMAGE number of f\&v damaged, LBRAREA, ZEROQRET nzerohrv interacted w/ qkeyret, LBRQRET hlbryes interacted w/ qkeyret, DMGQRET ndamage interacted w/ qkeyret, FERTQRET fertyes interacted w/ qkeyret, QKEYRTO qkeyret interacted w/ tomato
b Dependent Variable: VRETNET

## Coefficients(a)

## Model

|  | B | Std. Error | Beta | t | sig |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (Constant) | -1106.142 | 598.398 |  | -1.849 | . 065 |
| NFV number of $\mathrm{f} \& \mathrm{v}$ produced | 363.153 | 92.173 | . 136 | 3.940 | . 000 |
| FEMHEAD female headed hh | 1674.734 | 829.146 | . 062 | 2.020 | . 044 |
| DMGQRET ndamage interacted w/ qkeyret | . 663 | . 103 | . 442 | 6.461 | . 000 |
| NDAMAGE number of $\mathrm{f} \& \mathrm{v}$ damaged | -333.174 | 133.877 | -. 102 | -2.489 | . 013 |
| ZEROQRET nzerohrv interacted w/ qkeyret | -1.148 | . 171 | -. 307 | -6.724 | . 000 |
| NZEROHRV | 489.666 | 119.958 | . 178 | 4.082 | . 000 |
| FERTQRET fertyes interacted w/ qkeyret | -3.829 | . 526 | -. 693 | -7.287 | . 000 |
| LBRQRET hlbryes interacted w/ qkeyret | -6.557 | 1.005 | -. 503 | -6.524 | . 000 |
| LBRAREA | -230.979 | 106.527 | -. 096 | -2.168 | . 031 |
| HLBRYES used hired labour | 10203.744 | 1945.584 | . 280 | 5.245 | . 000 |
| QKEYRET quant of prodn of key retained crop based on quantity retained approach | 17.950 | 1.044 | 3.347 | 17.201 | . 000 |
| QKEYRTO qkeyret interacted w/ tomato | -14.629 | 1.025 | -2.288 | -14.275 | . 000 |
| QKEYRSU qkeyret interacted w/ sukuma | -12.954 | 1.099 | -. 718 | -11.786 | . 000 |
| QKEYRPU qkeyret interacted w/ pumpkin | -2.545 | 1.058 | -. 120 | -2.405 | . 017 |
| QKEYRAV qkeyret interacted w/ avocado | -9.042 | 2.025 | -. 150 | -4.464 | . 000 |
| QKEYRCB qkeyret interacted w/ cabbage | -13.267 | . 983 | -. 979 | -13.496 | . 000 |
| QKEYRPP qkeyret interacted w/ pawpaw | -14.227 | 6.176 | -. 070 | -2.304 | . 022 |
| QKEYRGV qkeyret interacted w/ guava | -7.058 | 2.544 | -. 089 | -2.774 | . 006 |
| QKEYROR qkeyret interacted w/ orange | -8.671 | 1.579 | -. 179 | -5.490 | . 000 |
| QKEYRCP qkeyret interacted w/ cowplvs | -16.417 | 6.195 | -. 080 | -2.650 | . 008 |
| QKEYRIV qkeyret interacted w/ indigveg | -13.639 | 3.860 | -. 109 | -3.534 | . 000 |

[^10]
## Zone 4

## Model Summary(b)

| $R$ | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.682(\mathrm{a})$ | .466 | .438 | 7923.85201 |  |

a Predictors: (Constant), QKEYRSC qkeyret interacted w/ chewcane, QKEYRIV qkeyret interacted w/ indigveg, QKEYRON qkeyret interacted w/ onions, QKEYRPU qkeyret interacted w/ pumpkin, QKEYRPP qkeyret interacted w/ pawpaw, ZEROQRET nzerohrv interacted w/ qkeyret, QKEYRSU qkeyret interacted w/ sukuma, NADULT \# of adults in hh, QKEYRMG qkeyret interacted w/ mango, CBBGRET, QKEYRAV qkeyret interacted $w /$ avocado, PRODYEAR Farmer's view about production year 1999/2000, NFV number of $f \& v$ produced, AVOCRET, NSLDQRET nsold interacted w/ qkeyret, SUKRET, PUMPRET, NSOLD number of f\&v sold, ONIONRET, NFVQRET nfv interacted w/ qkeyret b Dependent Variable: VRETNET

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | 898.958 | 1762.505 |  | .510 | .610 |
| NFV number of f\&v produced | 266.592 | 157.581 | .095 | 1.692 | .092 |
| NFVQRET nfv interacted w/ qkeyret | .564 | .109 | .855 | 5.182 | .000 |
| NSLDQRET nsold interacted w/ qkeyret | -.598 | .153 | -.601 | -3.896 | .000 |
| NSOLD number of f\&v sold | 514.161 | 222.139 | .143 | 2.315 | .021 |
| NADULT \# of adults in hh | 321.860 | 149.673 | .083 | 2.150 | .032 |
| ZEROQRET nzerohrv interacted w/ qkeyret | -.304 | .083 | -.148 | -3.666 | .000 |
| PRODYEAR Farmer's view about production | 227.760 | 638.804 | .014 | .357 | .722 |
| year 1999/2000 |  |  |  |  |  |
| QKEYRSU qkeyret interacted w/ sukuma | 3.521 | 1.450 | .120 | 2.428 | .016 |
| SUKRET | -3192.605 | 1544.352 | -.104 | -2.067 | .039 |
| QKEYRPU qkeyret interacted w/ pumpkin | 13.412 | 7.724 | .089 | 1.737 | .083 |
| PUMPRET | -4479.244 | 3067.402 | -.075 | -1.460 | .145 |
| QKEYRMG qkeyret interacted w/ mango | 6.129 | 2.273 | .104 | 2.697 | .007 |
| QKEYRAV qkeyret interacted w/ avocado | 1.502 | .415 | .197 | 3.622 | .000 |
| AVOCRET | -2471.642 | 1039.874 | -.105 | -2.377 | .018 |
| CBBGRET | -5176.036 | 1683.479 | -.129 | -3.075 | .002 |
| QKEYRPP qkeyret interacted w/ pawpaw | 4.051 | 3.235 | .048 | 1.252 | .211 |
| QKEYRON qkeyret interacted w/ onions | 40.497 | 23.387 | .176 | 1.732 | .084 |
| ONIONRET | -13116.827 | 9687.040 | -.137 | -1.354 | .177 |
| QKEYRIV qkeyret interacted w/ indigveg | 12.679 | 1.969 | .246 | 6.439 | .000 |
| QKEYRSC qkeyret interacted w/ chewcane | 2.281 | 1.216 | .075 | 1.876 | .061 |

[^11]D. Sold Fruit \& Vegetable, Zonal Models

## Zone 1

Model

| R | R Square | Adjusted <br> R Square | Std. Error <br> of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.946(\mathrm{a})$ | .894 | .883 | 13291.041 <br> 23 |  |

a Predictors: (Constant), QKEYSSC qkeysold interacted w/ chewcane, LBRAREA, QKEYSCB qkeysold interacted w/ cabbage, QKEYSAV qkeysold interacted w/ avocado, QKEYSPP qkeysold interacted w/ pawpaw, QKEYSOR qkeysold interacted w/ orange, QKEYSPU qkeysold interacted w/ pumpkin, QKEYSMG qkeysold interacted w/ mango, QKEYSCC qkeysold interacted w/ coconut, QKEYSSU qkeysold interacted w/ sukuma, ORDCOMP order interacted with ecompare, NZEROHRV, QKEYSTO qkeysold interacted w/ tomato, NSOLD number of f\&v sold, ZEROQSLD nzerohrv interacted w/ qkeysold, LBRQSLD hlbryes interacted w/ qkeysold, QKEYSOLD quant of prodn of key sales crop based on value sold approach
b Dependent Variable: VSOLDNET

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -11263.415 | 3183.708 |  | -3.538 | .001 |
| NSOLD number of f\&v sold | 2435.122 | 388.773 | .194 | 6.264 | .000 |
| ORDCOMP order interacted with ecompare | 502.445 | 282.964 | .049 | 1.776 | .078 |
| ZEROQSLD nzerohrv interacted w/ qkeysold | -1.741 | .136 | -.869 | -12.826 | .000 |
| NZEROHRV | 845.830 | 296.992 | .098 | 2.848 | .005 |
| LBRQSLD hlbryes interacted w/ qkeysold | 8.056 | .786 | .745 | 10.249 | .000 |
| LBRAREA | -1713.733 | 511.685 | -.129 | -3.349 | .001 |
| QKEYSOLD quant of prodn of key sales crop | 25.085 | 1.079 | 3.683 | 23.252 | .000 |
| based on value sold approach |  |  |  |  |  |
| QKEYSTO qkeysold interacted w/ tomato | -17.387 | 1.510 | -.371 | -11.514 | .000 |
| QKEYSSU qkeysold interacted w/ sukuma | -20.355 | 3.193 | -.171 | -6.374 | .000 |
| QKEYSPU qkeysold interacted w/ pumpkin | -15.742 | 4.434 | -.095 | -3.550 | .001 |
| QKEYSMG qkeysold interacted w/ mango | -22.230 | 1.246 | -.861 | -17.846 | .000 |
| QKEYSAV qkeysold interacted w/ avocado | -20.452 | 1.110 | -1.801 | -18.428 | .000 |
| QKEYSCB qkeysold interacted w/ cabbage | -10.916 | 2.872 | -.105 | -3.801 | .000 |
| QKEYSPP qkeysold interacted w/ pawpaw | -21.809 | 3.792 | -.154 | -5.751 | .000 |
| QKEYSCC qkeysold interacted w/ coconut | -22.034 | 1.072 | -2.478 | -20.561 | .000 |
| QKEYSOR qkeysold interacted w/ orange | -13.603 | 1.958 | -.217 | -6.947 | .000 |
| QKEYSSC qkeysold interacted w/ chewcane | -22.013 | 2.179 | -.291 | -10.103 | .000 |

[^12]Sold Fruit \& Vegetable, Zonal Models
Zone 2

## Model Summary(b)

Model

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.845(\mathrm{a})$ | .714 | .684 | 6040.79365 |  |

a Predictors: (Constant), CHEWSLD, NADULT \# of adults in hh, QKEYSMG qkeysold interacted w/ mango, QKEYSCP qkeysold interacted w/ cowplvs, QKEYSOR qkeysold interacted w/ orange, QKEYSAV qkeysold interacted w/ avocado, QKEYSSU qkeysold interacted w/ sukuma, QKEYSTO qkeysold interacted w/ tomato, QKEYSPP qkeysold interacted w/ pawpaw, QKEYSCB qkeysold interacted w/ cabbage, SCH HEAD years of schooling for hh head, ZEROQSLD nzerohrv interacted w/ qkeysold, NSOLD number of f\&v sold, FERTAREA, TOMSLD, SUKSLD, QKEYSIV qkeysold interacted w/ indigveg, FERTYES Used fertilizer, 1 yes, 0 no, FERTQSLD fertyes interacted w/ qkeysold, DMGQSLD ndamage interacted w/ qkeysold, NSLDQSLD nsold interacted w/ qkeysold, QKEYSOLD quant of prodn of key sales crop based on value sold approach b Dependent Variable: VSOLDNET

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (Constant) | -141.797 | 1166.969 |  | -. 122 | . 903 |
| NSLDQSLD nsold interacted w/ qkeysold | . 299 | . 229 | . 171 | 1.303 | . 194 |
| NSOLD number of $\mathrm{f} \& \mathrm{v}$ sold | 794.167 | 234.790 | . 161 | 3.382 | . 001 |
| NADULT \# of adults in hh | -297.584 | 141.923 | -. 082 | -2.097 | . 037 |
| SCH_HEAD years of schooling for hh head | 129.729 | 100.649 | . 052 | 1.289 | . 199 |
| DMGQSLD ndamage interacted w/ qkeysold | -. 437 | . 334 | -. 160 | -1.309 | . 192 |
| ZEROQSLD nzerohrv interacted w/ qkeysold | . 861 | . 336 | . 169 | 2.562 | . 011 |
| FERTQSLD fertyes interacted w/ qkeysold | -14.466 | 2.082 | -. 974 | -6.947 | . 000 |
| FERTAREA | 1017.603 | 151.126 | . 413 | 6.733 | . 000 |
| FERTYES Used fertilizer, 1 yes, 0 no | -2524.489 | 1413.251 | -. 112 | -1.786 | . 075 |
| QKEYSOLD quant of prodn of key sales crop based on value sold approach | 23.338 | 1.987 | 2.508 | 11.747 | . 000 |
| QKEYSTO qkeysold interacted w/ tomato | -4.139 | 1.547 | -. 173 | -2.675 | . 008 |
| TOMSLD | -3366.664 | 1582.733 | -. 097 | -2.127 | . 035 |
| QKEYSSU qkeysold interacted w/ sukuma | -6.962 | 1.819 | -. 206 | -3.827 | . 000 |
| SUKSLD | -3201.589 | 1630.905 | -. 098 | -1.963 | . 051 |
| QKEYSMG qkeysold interacted w/ mango | -21.296 | 2.217 | -1.346 | -9.607 | . 000 |
| QKEYSAV qkeysold interacted w/ avocado | -17.238 | 4.395 | -. 148 | -3.922 | . 000 |
| QKEYSCB qkeysold interacted w/ cabbage | -11.024 | 3.176 | -. 135 | -3.471 | . 001 |
| QKEYSPP qkeysold interacted w/ pawpaw | -20.326 | 2.797 | -. 360 | -7.268 | . 000 |
| QKEYSOR qkeysold interacted w/ orange | -19.803 | 2.641 | -. 370 | -7.499 | . 000 |
| QKEYSCP qkeysold interacted w/ cowplvs | -19.846 | 2.997 | -. 294 | -6.622 | . 000 |
| QKEYSIV qkeysold interacted w/ indigveg | -11.632 | 2.628 | -. 281 | -4.427 | . 000 |
| CHEWSLD | -183763.403 | 19867.763 | -1.112 | -9.249 | . 000 |

Dependent Variable: VSOLDNET

Zone 3

## Model Summary(b)

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | :---: | :---: |
| .940 (a) | .883 | .870 | 6898.12254 |  |

a Predictors: (Constant), QKEYSSC qkeysold interacted w/ chewcane, NFVQSLD nfv interacted w/ qkeysold, QKEYSPP qkeysold interacted w/ pawpaw, QKEYSGV qkeysold interacted w/ guava, QKEYSIV qkeysold interacted w/ indigveg, QKEYSAV qkeysold interacted w/ avocado, QKEYSOR qkeysold interacted w/ orange, QKEYSON qkeysold interacted w/ onions, QKEYSSU qkeysold interacted w/ sukuma, QKEYSMG qkeysold interacted w/ mango, TACRES total cropped acres, QKEYSPU qkeysold interacted w/ pumpkin, CBBGSLD, SCH_HEAD years of schooling for hh head, NSOLD number of f\&v sold, TOMSLD, NDAMAGE number of f\&v damaged, HLBRYES used hired labour, SUKSLD, ZEROQSLD nzerohrv interacted w/ qkeysold, QKEYSCB qkeysold interacted w/ cabbage, LBRQSLD hlbryes interacted w/ qkeysold, FERTAREA, DMGQSLD ndamage interacted w/ qkeysold, FERTQSLD fertyes interacted w/ qkeysold, QKEYSTO qkeysold interacted w/ tomato, NSLDQSLD nsold interacted w/ qkeysold, QKEYSOLD quant of prodn of key sales crop based on value sold approach
b Dependent Variable: VSOLDNET

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -439.160 | 1159.333 |  | -.379 | .705 |
| NFVQSLD nfv interacted w/ qkeysold | -.368 | .131 | -.470 | -2.815 | .005 |
| NSLDQSLD nsold interacted w/ qkeysold | .704 | .286 | .412 | 2.459 | .015 |
| NSOLD number of f\&v sold | 1027.771 | 243.071 | .136 | 4.228 | .000 |
| SCH_HEAD years of schooling for hh head | 156.184 | 97.988 | .037 | 1.594 | .112 |
| TACRES total cropped acres | -204.767 | 66.474 | -.158 | -3.080 | .002 |
| DMGQSLD ndamage interacted w/ qkeysold | 2.554 | .202 | .775 | 12.657 | .000 |
| NDAMAGE number of f\&v damaged | -548.361 | 203.889 | -.082 | -2.690 | .008 |
| ZEROQSLD nzerohrv interacted w/ qkeysold | -.729 | .163 | -.137 | -4.466 | .000 |
| FERTQSLD fertyes interacted w/ qkeysold | -8.632 | 1.013 | -.847 | -8.524 | .000 |
| FERTAREA | 186.435 | 70.375 | .135 | 2.649 | .009 |
| LBRQSLD hlbryes interacted w/ qkeysold | -5.714 | 1.515 | -.242 | -3.773 | .000 |
| HLBRYES used hired labour | 10726.141 | 2450.790 | .156 | 4.377 | .000 |
| QKEYSOLD quant of prodn of key sales crop | 18.935 | 1.971 | 1.909 | 9.608 | .000 |
| based on value sold approach |  |  |  |  |  |
| QKEYSTO qkeysold interacted w/ tomato | -7.122 | 1.685 | -.602 | -4.226 | .000 |
| TOMSLD | -4107.286 | 1743.366 | -.067 | -2.356 | .019 |
| QKEYSSU qkeysold interacted w/ sukuma | -8.358 | 1.882 | -.177 | -4.440 | .000 |
| SUKSLD | -3348.592 | 1358.184 | -.068 | -2.465 | .014 |
| QKEYSPU qkeysold interacted w/ pumpkin | -7.829 | 1.407 | -.175 | -5.565 | .000 |
| QKEYSMG qkeysold interacted w/ mango | -34.266 | 2.973 | -.436 | -11.526 | .000 |
| QKEYSAV qkeysold interacted w/ avocado | -16.752 | 3.481 | -.113 | -4.812 | .000 |
| QKEYSCB qkeysold interacted w/ cabbage | -9.915 | 1.684 | -.420 | -5.889 | .000 |
| CBBGSLD | -4644.844 | 2050.350 | -.074 | -2.265 | .024 |
| QKEYSPP qkeysold interacted w/ pawpaw | -24.529 | 8.954 | -.061 | -2.739 | .007 |
| QKEYSGV qkeysold interacted w/ guava | -17.833 | 4.801 | -.085 | -3.714 | .000 |
| QKEYSOR qkeysold interacted w/ orange | -6.659 | 1.291 | -.166 | -5.160 | .000 |
| QKEYSON qkeysold interacted w/ onions | -16.045 | 2.873 | -.147 | -5.585 | .000 |
| QKEYSIV qkeysold interacted w/ indigveg | -17.851 | 5.627 | -.072 | -3.172 | .002 |
| QKEYSSC qkeysold interacted w/ chewcane | -18.700 | 4.568 | -.095 | -4.093 | .000 |

a Dependent Variable: VSOLDNET
Sold Fruit \& Vegetable, Zonal Models

Zone 4

## Model Summary(b)

| $R$ | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.881(\mathrm{a})$ | .777 | .761 | 15086.20795 |  |

a Predictors: (Constant), INDIGSLD, QKEYSPU qkeysold interacted w/ pumpkin, DMGQSLD ndamage interacted w/ qkeysold, ONIONSLD, NZEROHRV, ORDCOMP order interacted with ecompare, TOMSLD, FEMHEAD female headed hh, QKEYSSU qkeysold interacted w/ sukuma, AVOCSLD, PRODYEAR Farmer's view about production year 1999/2000, QKEYSAV qkeysold interacted w/ avocado, CBBGSLD, NDAMAGE number of $f \& v$ damaged, NSOLD number of $f \& v$ sold, SUKSLD, QKEYSON qkeysold interacted $w /$ onions, PUMPSLD, QKEYSIV qkeysold interacted w/ indigveg, QKEYSCB qkeysold interacted w/ cabbage, QKEYSOLD quant of prodn of key sales crop based on value sold approach, NSLDQSLD nsold interacted w/ qkeysold, NFVQSLD nfv interacted w/ qkeysold
b Dependent Variable: VSOLDNET

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -3062.019 | 3270.285 |  | -.936 | .350 |
| NFVQSLD nfv interacted w/ qkeysold | -1.268 | .216 | -1.049 | -5.873 | .000 |
| NSLDQSLD nsold interacted w/ qkeysold | .667 | .249 | .374 | 2.676 | .008 |
| NSOLD number of f\&v sold | 2778.324 | 466.669 | .258 | 5.954 | .000 |
| ORDCOMP order interacted with ecompare | 296.532 | 226.682 | .036 | 1.308 | .192 |
| FEMHEAD female headed hh | -3774.059 | 2359.328 | -.043 | -1.600 | .111 |
| DMGQSLD ndamage interacted w/ qkeysold | .839 | .226 | .218 | 3.716 | .000 |
| NDAMAGE number of f\&v damaged | -564.477 | 394.119 | -.051 | -1.432 | .153 |
| NZEROHRV | -675.464 | 252.386 | -.074 | -2.676 | .008 |
| PRODYEAR Farmer's view about production | 3.203 | 2.107 | .045 | 1.520 | .129 |
| year 1999/2000 |  |  |  |  |  |
| QKEYSOLD quant of prodn of key sales crop | 15.110 | 1.970 | 1.139 | 7.669 | .000 |
| based on value sold approach |  |  |  |  |  |
| TOMSLD | -6423.106 | 3983.973 | -.045 | -1.612 | .108 |
| QKEYSSU qkeysold interacted w/ sukuma | -6.570 | 2.624 | -.090 | -2.504 | .013 |
| SUKSLD | -4055.054 | 3709.315 | -.038 | -1.093 | .275 |
| QKEYSPU qkeysold interacted w/ pumpkin | 49.303 | 7.020 | .261 | 7.023 | .000 |
| PUMPSLD | -31407.027 | 12438.845 | -.095 | -2.525 | .012 |
| QKEYSAV qkeysold interacted w/ avocado | -5.165 | 1.164 | -.199 | -4.437 | .000 |
| AVOCSLD | -6374.722 | 2953.898 | -.067 | -2.158 | .032 |
| QKEYSCB qkeysold interacted w/ cabbage | 2.135 | 1.182 | .129 | 1.807 | .072 |
| CBBGSLD | -11265.588 | 3444.395 | -.127 | -3.271 | .001 |
| QKEYSON qkeysold interacted w/ onions | 10.008 | 5.310 | .069 | 1.885 | .060 |
| ONIONSLD | -10007.723 | 5236.789 | -.068 | -1.911 | .057 |
| QKEYSIV qkeysold interacted w/ indigveg | 35.694 | 5.015 | .295 | 7.118 | .000 |
| INDIGSLD | -31784.770 | 9642.952 | -.135 | -3.296 | .001 |

a Dependent Variable: VSOLDNET
E. Industrial Crops, Zonal Models

## Zone 1

## Model Summary(b)

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $1.000($ <br> a) | .999 | .998 | 170.44537 |  |

a Predictors: (Constant), NDAMAGE Number of industrial crops damaged, FERTYES Used fertilizer, 1 yes, 0 no, SCH_HEAD years of schooling for hh head, PVASST02 Unstandardized Predicted Value, QKEYVOT, PRODYEAR Farmer's view about production year 1999/2000, QKEYV quant of key crop based on value approach, NZEROHRV, QKEYVCF, DMGQKEY ndamage interacted w/ qkeyv, FEMHEAD female headed hh, OTHER, FERTQKEY fertyes interacted w/ qkeyv, ZEROQKEY nzerohrv interacted w/ qkeyv
b Dependent Variable: VSOLDNET

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | 14.540 | 123.839 |  | .117 | .908 |
| FEMHEAD female headed hh | 1137.515 | 238.213 | .079 | 4.775 | .000 |
| PVASST02 Unstandardized Predicted Value | -.002 | .000 | -.086 | -4.825 | .000 |
| SCH_HEAD years of schooling for hh head | 31.898 | 14.355 | .034 | 2.222 | .046 |
| QKEYV quant of key crop based on value | .637 | .030 | .263 | 21.238 | .000 |
| approach |  |  |  |  |  |
| QKEYVCF | 25.997 | .398 | 1.132 | 65.241 | .000 |
| QKEYVOT | 4.385 | 2.921 | .020 | 1.501 | .159 |
| FERTQKEY fertyes interacted w/ qkeyv | -9.470 | 1.285 | -.217 | -7.372 | .000 |
| DMGQKEY ndamage interacted w/ qkeyv | .881 | .135 | .092 | 6.511 | .000 |
| ZEROQKEY nzerohrv interacted w/ qkeyv | 2.691 | 1.021 | .080 | 2.636 | .022 |
| OTHER | 1686.691 | 200.181 | .140 | 8.426 | .000 |
| PRODYEAR Farmer's view about production | -116.167 | 57.811 | -.027 | -2.009 | .068 |
| year 1999/2000 |  |  |  |  |  |
| FERTYES Used fertilizer, 1 yes, 0 no | 838.266 | 215.146 | .101 | 3.896 | .002 |
| NZEROHRV | -281.295 | 149.955 | -.045 | -1.876 | .085 |
| NDAMAGE Number of industrial crops | -161.893 | 98.005 | -.026 | -1.652 | .124 |
| damaged |  |  |  |  |  |

a Dependent Variable: VSOLDNET

Industrial Crops, Zonal Models

Zone 2

## Model Summary(b)

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| .999 (a) | .998 | .998 | 4166.29716 |  |

a Predictors: (Constant), TACRES total cropped acres, DMGQKEY ndamage interacted w/ qkeyv, FERTQKEY fertyes interacted w/ qkeyv, PRODYEAR Farmer's view about production year 1999/2000, LBRQKEY hlbryes interacted w/ qkeyv, FERTAREA fertyes interacted with acres, LBRAREA hlbryes interacted with acres, NSLDQKEY nsold interacted w/ qkeyv, QKEYVSG, QKEYV quant of key crop based on value approach b Dependent Variable: VSOLDNET

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -2022.334 | 942.866 |  | -2.145 | .034 |
| QKEYV quant of key crop based on value | 1.044 | .320 | .643 | 3.268 | .001 |
| approach |  |  |  |  |  |
| QKEYVSG | .557 | .315 | .344 | 1.766 | .080 |
| DMGQKEY ndamage interacted w/ qkeyv | -.036 | .015 | -.016 | -2.453 | .015 |
| LBRQKEY hlbryes interacted w/ qkeyv | -.041 | .016 | -.020 | -2.569 | .011 |
| NSLDQKEY nsold interacted w/ qkeyv | .035 | .030 | .023 | 1.160 | .248 |
| FERTQKEY fertyes interacted w/ qkeyv | .030 | .020 | .017 | 1.508 | .134 |
| LBRAREA hlbryes interacted with acres | -439.002 | 158.960 | -.027 | -2.762 | .007 |
| PRODYEAR Farmer's view about production | 1112.522 | 432.277 | .011 | 2.574 | .011 |
| year 1999/2000 |  |  |  |  |  |
| FERTAREA fertyes interacted with acres | -432.516 | 137.268 | -.024 | -3.151 | .002 |
| TACRES total cropped acres | 286.100 | 171.136 | .015 | 1.672 | .097 |

a Dependent Variable: VSOLDNET

## Industrial Crops, Zonal Models

## Zone 3

## Model Summary(b)

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.999(\mathrm{a})$ | .997 | .997 | 6813.71050 |  |

a Predictors: (Constant), COFFEE, NADULT \# of adults in hh, ZEROQKEY nzerohrv interacted w/ qkeyv, PVASST02 Unstandardized Predicted Value, NSOLD Number of industrial crops sold, QKEYVPY, QKEYVTE, HLBRYES used hired labour, DMGQKEY ndamage interacted w/ qkeyv, FERTAREA fertyes interacted with acres, FERTQKEY fertyes interacted w/ qkeyv
b Dependent Variable: VSOLDNET

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | :---: |
| (Constant) | -819.207 | 7270.496 |  | -.113 | .911 |
| NADULT \# of adults in hh | -778.929 | 313.967 | -.017 | -2.481 | .015 |
| PVASST02 Unstandardized Predicted Value | -.013 | .004 | -.021 | -3.217 | .002 |
| NSOLD Number of industrial crops sold | 9173.277 | 7073.782 | .008 | 1.297 | .199 |
| QKEYVPY | 69.348 | 8.349 | .055 | 8.306 | .000 |
| QKEYVTE | 5.322 | 3.914 | .339 | 1.360 | .178 |
| DMGQKEY ndamage interacted w/ qkeyv | -1.637 | .252 | -.050 | -6.505 | .000 |
| ZEROQKEY nzerohrv interacted w/ qkeyv | 3.251 | 1.055 | .020 | 3.080 | .003 |
| FERTQKEY fertyes interacted w/ qkeyv | 11.616 | 3.950 | .739 | 2.941 | .004 |
| FERTAREA fertyes interacted with acres | -1213.995 | 286.672 | -.049 | -4.235 | .000 |
| HLBRYES used hired labour | -5460.470 | 1810.019 | -.022 | -3.017 | .004 |
| COFFEE | 6145.804 | 3109.470 | .013 | 1.976 | .052 |

a Dependent Variable: VSOLDNET

Industrial Crops, Zonal Models

## Zone 4

## Model Summary(b)

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.979(\mathrm{a})$ | .958 | .957 | 15927.30188 |  |

a Predictors: (Constant), OTHER, LBRAREA hlbryes interacted with acres, FEMHEAD female headed hh, NDAMAGE Number of industrial crops damaged, PRODYEAR Farmer's view about production year 1999/2000, QKEYVCF, NSOLD Number of industrial crops sold, QKEYVTE, DMGQKEY ndamage interacted w/ qkeyv, QKEYVOT, NSLDQKEY nsold interacted w/ qkeyv, LBRQKEY hlbryes interacted w/ qkeyv, FERTQKEY fertyes interacted w/ qkeyv
b Dependent Variable: VSOLDNET

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -5154.453 | 2835.010 |  | -1.818 | .070 |
| FEMHEAD female headed hh | 3809.204 | 2561.211 | .017 | 1.487 | .138 |
| NSOLD Number of industrial crops sold | 3955.139 | 1513.901 | .037 | 2.613 | .009 |
| QKEYVCF | 24.698 | 1.572 | .515 | 15.716 | .000 |
| QKEYVTE | 20.717 | 1.522 | .886 | 13.611 | .000 |
| QKEYVOT | 36.782 | 15.716 | .059 | 2.340 | .020 |
| FERTQKEY fertyes interacted w/ qkeyv | -3.012 | 1.525 | -.134 | -1.975 | .049 |
| NSLDQKEY nsold interacted w/ qkeyv | 2.651 | .288 | .251 | 9.193 | .000 |
| DMGQKEY ndamage interacted w/ qkeyv | -2.475 | .265 | -.183 | -9.352 | .000 |
| LBRQKEY hlbryes interacted w/ qkeyv | 1.371 | .685 | .058 | 2.001 | .046 |
| PRODYEAR Farmer's view about production | -8.471 | 2.184 | -.047 | -3.878 | .000 |
| year 1999/2000 |  |  |  |  |  |
| NDAMAGE Number of industrial crops damaged | 2666.692 | 1054.065 | .036 | 2.530 | .012 |
| LBRAREA hlbryes interacted with acres | -824.716 | 370.740 | -.034 | -2.225 | .027 |
| OTHER | -28908.623 | 20655.782 | -.035 | -1.400 | .163 |

a Dependent Variable: VSOLDNET
F. Livestock, Zonal Models

## Zone 1

## Model Summary(b)

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | :---: | :---: |
| .820 (a) | .673 | .652 | 15807.06224 |  |

a Predictors: (Constant), INT_GCOW, NCHICK, SOLDCBUL, SOLDHNY, SOLDMK, SOLDHIDE, NCCALF, NSOLD_LV, NLBULL, NSHEEP, NGCALF, NPROD LP, NGOAT
b Dependent Variable: VNET_LV Net value livestock income

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (Constant) | -8408.781 | 3065.337 |  | -2.743 | . 007 |
| NPROD_LP | 7810.978 | 2176.520 | . 231 | 3.589 | . 000 |
| NLBULL | -2504.211 | 910.495 | -. 160 | -2.750 | . 006 |
| NGCALF | 39384.281 | 8062.408 | . 300 | 4.885 | . 000 |
| NCCALF | 5514.014 | 2460.414 | . 104 | 2.241 | . 026 |
| NSHEEP | 620.888 | 457.080 | . 099 | 1.358 | . 176 |
| NGOAT | 244.475 | 99.120 | . 220 | 2.466 | . 014 |
| NCHICK | 302.438 | 90.919 | . 207 | 3.326 | . 001 |
| NSOLD_LV | 5922.187 | 1751.136 | . 164 | 3.382 | . 001 |
| SOLDCBUL | 26444.517 | 10280.936 | . 116 | 2.572 | . 011 |
| SOLDMK | 10043.205 | 2918.763 | . 174 | 3.441 | . 001 |
| SOLDHNY | -8364.227 | 5241.071 | -. 072 | -1.596 | . 112 |
| SOLDHIDE | -8659.147 | 4172.113 | -. 111 | -2.075 | . 039 |
| INT_GCOW | 12751.882 | 5182.232 | . 158 | 2.461 | . 015 |

a Dependent Variable: VNET_LV Net value livestock income

## Livestock, Zonal Models

Zone 2

## Model Summary(b)

| $R$ | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.730(\mathrm{a})$ | .533 | .508 | 14840.50375 |  |

a Predictors: (Constant), INT_GCOW, SOLDCBUL, NCHICK, NLCALF, NDUCK, FEMHEAD female headed hh, NSOLD_LV, SOLDGBUL, SCH_HEAD years of schooling for hh head, SOLDGCOW, NLCOW, NGBULL, NGCOW
b Dependent Variable: VNET_LV Net value livestock income

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (Constant) | 4208.773 | 2154.558 |  | 1.953 | . 052 |
| SCH_HEAD years of schooling for hh head | -567.905 | 237.306 | -. 118 | -2.393 | . 017 |
| FEMHEAD female headed hh | -4416.253 | 2645.914 | -. 080 | -1.669 | . 096 |
| NGCOW | -12693.225 | 6792.222 | -. 203 | -1.869 | . 063 |
| NLCOW | 1288.536 | 544.300 | . 127 | 2.367 | . 019 |
| NGBULL | -136651.321 | 24739.047 | -. 571 | -5.524 | . 000 |
| NLCALF | 3118.284 | 819.701 | . 197 | 3.804 | . 000 |
| NCHICK | 191.131 | 99.822 | . 087 | 1.915 | . 057 |
| NDUCK | 1856.674 | 865.183 | . 097 | 2.146 | . 033 |
| NSOLD_LV | 9492.291 | 1293.257 | . 344 | 7.340 | . 000 |
| SOLDGCOW | 117095.668 | 15126.095 | . 489 | 7.741 | . 000 |
| SOLDGBUL | 75219.940 | 26238.753 | . 223 | 2.867 | . 005 |
| SOLDCBUL | 66724.976 | 15294.133 | . 198 | 4.363 | . 000 |
| INT_GCOW | 38677.162 | 8087.913 | . 566 | 4.782 | . 000 |

a Dependent Variable: VNET_LV Net value livestock income

## Livestock, Zonal Models

## Zone 3

## Model Summary(b)

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.882(\mathrm{a})$ | .778 | .772 | 42074.50983 |  |

a Predictors: (Constant), INT_CHIC, NLCALF, NSOLD_LV, NGBULL, NCCALF, ORDCOMP order interacted with ecompare, SOLDGCOW, SOLDCCOW, NSHEEP, NGCALF
b Dependent Variable: VNET_LV Net value livestock income

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -9863.021 | 5738.234 |  | -1.719 | .086 |
| ORDCOMP order interacted with ecompare | 2180.696 | 549.978 | .104 | 3.965 | .000 |
| NGBULL | 25674.329 | 10627.666 | .073 | 2.416 | .016 |
| NGCALF | 13311.653 | 2026.348 | .225 | 6.569 | .000 |
| NCCALF | 7210.394 | 841.777 | .235 | 8.566 | .000 |
| NLCALF | 4029.659 | 1101.548 | .110 | 3.658 | .000 |
| NSHEEP | -975.345 | 321.786 | -.093 | -3.031 | .003 |
| NSOLD_LV | 7182.689 | 2305.887 | .093 | 3.115 | .002 |
| SOLDGCOW | 46701.200 | 8976.448 | .156 | 5.203 | .000 |
| SOLDCCOW | 12458.441 | 6609.674 | .056 | 1.885 | .060 |
| INT_CHIC | 801.507 | 29.278 | .688 | 27.376 | .000 |

a Dependent Variable: VNET_LV Net value livestock income

## Livestock, Zonal Models

## Zone 4

## Model Summary(b)

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.561(\mathrm{a})$ | .314 | .293 | 31824.57607 |  |

a Predictors: (Constant), INT_GCOW, SOLDHNY, NDUCK, NSOLD_LV, SCH_HEAD years of schooling for hh head, NADULT \# of adults in hh, NSHEEP, ORDCOMP order interacted with ecompare, NPROD_LP, NCCOW
b Dependent Variable: VNET_LV Net value livestock income

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | :---: |
| (Constant) | -18886.147 | 8351.036 |  | -2.262 | .024 |
| NADULT \# of adults in hh | 1472.576 | 669.990 | .107 | 2.198 | .029 |
| ORDCOMP order interacted with ecompare | 437.315 | 471.359 | .045 | .928 | .354 |
| SCH_HEAD years of schooling for hh head | 662.908 | 425.818 | .074 | 1.557 | .121 |
| NPROD_LP | 7249.375 | 3639.473 | .102 | 1.992 | .047 |
| NCCOW | 6429.993 | 2541.349 | .135 | 2.530 | .012 |
| NSHEEP | -2261.054 | 1762.017 | -.061 | -1.283 | .200 |
| NDUCK | -7232.689 | 4137.208 | -.083 | -1.748 | .081 |
| NSOLD_LV | 7301.838 | 2125.522 | .167 | 3.435 | .001 |
| SOLDHNY | 27778.957 | 19399.561 | .070 | 1.432 | .153 |
| INT_GCOW | 17475.269 | 2099.111 | .467 | 8.325 | .000 |

a Dependent Variable: VNET_LV Net value livestock income

## G. Informal Off-Farm, Zonal Models

## Zone 1

## Model Summary(b)

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.741(\mathrm{a})$ | .550 | .526 | 44815.07640 |  |

a Predictors: (Constant), MTHBIKE, MTHTIMB, MINE mining business, DRIVER driver, MTHFSH, PVASST02 Unstandardized Predicted Value, NADULT \# of adults in hh, NMTHS \# of months hh had income from informal activities, TRANS transport business, ORDCOMP order interacted with cash income
b Dependent Variable: VINFORM earnings from all informal off-farm activities

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | :---: |
| (Constant) | -31251.101 | 12372.036 |  | -2.526 | .012 |
| PVASST02 Unstandardized Predicted Value | .049 | .014 | .171 | 3.397 | .001 |
| ORDCOMP order interacted with cash income | 1600.059 | 1088.766 | .077 | 1.470 | .143 |
| NMTHS \# of months hh had income from | 3111.325 | 862.127 | .186 | 3.609 | .000 |
| informal activities |  |  |  |  |  |
| MTHTIMB | 32025.551 | 3780.894 | .420 | 8.470 | .000 |
| DRIVER driver | 138859.886 | 23353.210 | .301 | 5.946 | .000 |
| MINE mining business | 166730.120 | 32437.709 | .257 | 5.140 | .000 |
| MTHFSH | 4313.994 | 1202.770 | .187 | 3.587 | .000 |
| NADULT \# of adults in hh | 2611.437 | 1162.089 | .116 | 2.247 | .026 |
| TRANS transport business | -42714.775 | 21314.524 | -.103 | -2.004 | .047 |
| MTHBIKE | 5332.797 | 2707.408 | .097 | 1.970 | .050 |

a Dependent Variable: VINFORM earnings from all informal off-farm activities

Informal Off-Farm, Zonal Models
Zone 2

## Model Summary(b)

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | :---: | :---: |
| $.803(\mathrm{a})$ | .645 | .624 | 33754.08641 |  |

a Predictors: (Constant), MTHTIMB, MTHTRANS, HAWK hawking, MTHCARP, SCH_HEAD years of schooling for hh head, RENT rental business, NADULT \# of adults in hh, WAGERATE Daily wagerate, NPEOPLE \# of people earning informal income, PVASST02 Unstandardized Predicted Value, MTHJAGG
b Dependent Variable: VINFORM earnings from all informal off-farm activities

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | :---: |
| (Constant) | -6967.077 | 12491.965 |  | -.558 | .578 |
| SCH_HEAD years of schooling for hh head | 824.366 | 571.518 | .066 | 1.442 | .151 |
| PVASST02 Unstandardized Predicted Value | .154 | .033 | .235 | 4.594 | .000 |
| NADULT \# of adults in hh | 1818.775 | 919.691 | .096 | 1.978 | .049 |
| WAGERATE Daily wagerate | -281.071 | 162.421 | -.080 | -1.731 | .085 |
| NPEOPLE \# of people earning informal | 12749.328 | 5304.512 | .113 | 2.403 | .017 |
| income |  |  |  |  |  |
| MTHJAGG | 9809.908 | 2066.884 | .261 | 4.746 | .000 |
| MTHTRANS | 25402.716 | 3580.051 | .393 | 7.096 | .000 |
| HAWK hawking | 64008.656 | 16306.853 | .183 | 3.925 | .000 |
| RENT rental business | 40678.896 | 11114.726 | .169 | 3.660 | .000 |
| MTHCARP | 1959.687 | 1076.295 | .082 | 1.821 | .070 |
| MTHTIMB | 2533.120 | 1661.087 | .067 | 1.525 | .129 |

[^13]Informal Off-Farm, Zonal Models

## Zone 3

## Model Summary(b)

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.507(\mathrm{a})$ | .257 | .228 | 91678.54995 |  |

a Predictors: (Constant), MTHBREW, NPEOPLE \# of people earning informal income, RENT rental business, NMTHS \# of months hh had income from informal activities, PVASST02 Unstandardized Predicted Value, ORDCOMP order interacted with cash income, FKIB farm kibarua, NPPLSQ
b Dependent Variable: VINFORM earnings from all informal off-farm activities

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -123839.918 | 34049.985 |  | -3.637 | .000 |
| ORDCOMP order interacted with cash income | 7780.774 | 2112.632 | .249 | 3.683 | .000 |
| PVASST02 Unstandardized Predicted Value | .110 | .032 | .223 | 3.388 | .001 |
| FKIB farm kibarua | -43053.826 | 17759.421 | -.182 | -2.424 | .016 |
| NMTHS \# of months hh had income from | 4797.670 | 1864.602 | .161 | 2.573 | .011 |
| informal activities |  |  |  |  |  |
| RENT rental business | -25560.470 | 17710.623 | -.089 | -1.443 | .150 |
| NPEOPLE \# of people earning informal | 74421.658 | 33175.035 | .554 | 2.243 | .026 |
| income |  |  |  |  |  |
| NPPLSQ | -10432.572 | 6789.869 | -.366 | -1.536 | .126 |
| MTHBREW | -5329.107 | 3499.001 | -.092 | -1.523 | .129 |

a Dependent Variable: VINFORM earnings from all informal off-farm activities

Informal Off-Farm, Zonal Models

## Zone 4

## Model Summary(b)

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | :---: | :---: |
| $.704(\mathrm{a})$ | .496 | .464 | 80871.92539 |  |

a Predictors: (Constant), MTHFKIB, MTHTIMB, MTHRENT, WAGERATE Daily wagerate, MTHAGTRD, SCH HEAD years of schooling for hh head, ORDCOMP order interacted with cash income, NMTHS \# of months hh had income from informal activities, NPEOPLE \# of people earning informal income, PVASST02 Unstandardized Predicted Value, RENT rental business
b Dependent Variable: VINFORM earnings from all informal off-farm activities

## Coefficients(a)

|  | l | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -109004.904 | 28468.493 |  | -3.829 | .000 |
| SCH_HEAD years of schooling for hh head | -1944.457 | 1532.916 | -.073 | -1.268 | .206 |
| PVASST02 Unstandardized Predicted Value | .175 | .035 | .314 | 4.995 | .000 |
| ORDCOMP order interacted with cash income | 7455.339 | 1966.758 | .235 | 3.791 | .000 |
| NMTHS \# of months hh had income from | 3183.883 | 1656.226 | .115 | 1.922 | .056 |
| informal activities |  |  |  |  |  |
| NPEOPLE \# of people earning informal income | 13809.235 | 11423.637 | .073 | 1.209 | .228 |
| WAGERATE Daily wagerate | 506.540 | 230.467 | .123 | 2.198 | .029 |
| MTHTIMB | 26297.069 | 3802.570 | .397 | 6.916 | .000 |
| MTHAGTRD | 3577.827 | 1606.443 | .124 | 2.227 | .027 |
| RENT rental business | -636606.227 | 400687.33 | -1.160 | -1.589 | .114 |
|  |  | 2 |  |  |  |
| MTHRENT | 51922.461 | 35032.231 | 1.079 | 1.482 | .140 |
| MTHFKIB | -1071.322 | 1469.015 | -.046 | -.729 | .467 |

a Dependent Variable: VINFORM earnings from all informal off-farm activities

## H. Salaries and Remittances, Zonal Models

## Zone 1

## Model Summary(b)

| $R$ | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :--- |
| $.798(\mathrm{a})$ | .637 | .606 | 41036.11433 |  |

a Predictors: (Constant), MTHWATCH, SCH_HEAD years of schooling for hh head, MTHSHOP, MTHPOL, MTHCLERK, MTHDRIVE, MTHMGR, MTHREMIT, MTHSALES, MTHTEACH, MTHPENS, ORDCOMP order interacted with ecompare, NPEOPLE \# of people earning sal or remit, NMTHS \# of months hh had income from sal or remit
b Dependent Variable: VSALREM earnings from all salary and remittance

## Coefficients(a)

|  | l | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | :---: |
| (Constant) | -69688.232 | 12345.862 |  | -5.645 | .000 |
| NPEOPLE \# of people earning sal or remit | 6481.401 | 5342.638 | .071 | 1.213 | .227 |
| NMTHS \# of months hh had income from sal | 2910.438 | 1094.872 | .167 | 2.658 | .009 |
| or remit |  |  |  |  |  |
| SCH_HEAD years of schooling for hh head | 2664.169 | 756.453 | .181 | 3.522 | .001 |
| ORDCOMP order interacted with ecompare | 5255.166 | 902.478 | .320 | 5.823 | .000 |
| MTHREMIT | -677.167 | 826.791 | -.056 | -.819 | .414 |
| MTHTEACH | 5141.314 | 994.561 | .286 | 5.169 | .000 |
| MTHDRIVE | 4489.422 | 1257.727 | .182 | 3.569 | .000 |
| MTHMGR | 10769.605 | 2078.873 | .256 | 5.181 | .000 |
| MTHPENS | -1340.316 | 1305.395 | -.054 | -1.027 | .306 |
| MTHCLERK | 3630.966 | 1902.485 | .096 | 1.909 | .058 |
| MTHSALES | 4357.810 | 1979.906 | .108 | 2.201 | .029 |
| MTHPOL | 2271.659 | 2026.528 | .054 | 1.121 | .264 |
| MTHSHOP | 2928.393 | 1967.799 | .080 | 1.488 | .139 |
| MTHWATCH | -1778.914 | 1729.866 | -.052 | -1.028 | .305 |

[^14]Salaries and Remittances, Zonal Models
Zone 2

## Model Summary(b)

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.704(\mathrm{a})$ | .496 | .468 | 43692.46523 |  |

a Predictors: (Constant), MTHCLERK, NPEOPLE \# of people earning sal or remit, MTHTEACH, MTHMGR, MTHPENS, PVASST02 Unstandardized Predicted Value, NMTHS \# of months hh had income from sal or remit, SCH_HEAD years of schooling for hh head, ORDCOMP order interacted with ecompare
b Dependent Variable: VSALREM earnings from all salary and remittance

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | :---: |
| (Constant) | -58186.314 | 12038.151 |  | -4.833 | .000 |
| NPEOPLE \# of people earning sal or remit | 33522.178 | 5391.670 | .360 | 6.217 | .000 |
| NMTHS \# of months hh had income from sal | 1667.729 | 938.769 | .113 | 1.777 | .078 |
| or remit |  |  |  |  |  |
| PVASST02 Unstandardized Predicted Value | .040 | .037 | .066 | 1.086 | .279 |
| SCH_HEAD years of schooling for hh head | 2065.134 | 859.876 | .156 | 2.402 | .017 |
| ORDCOMP order interacted with ecompare | 1366.761 | 963.926 | .093 | 1.418 | .158 |
| MTHTEACH | 3095.462 | 948.965 | .207 | 3.262 | .001 |
| MTHMGR | 3616.480 | 2186.160 | .095 | 1.654 | .100 |
| MTHPENS | 2329.378 | 1318.657 | .104 | 1.766 | .079 |
| MTHCLERK | 3667.307 | 1330.336 | .163 | 2.757 | .007 |

[^15]Salaries and Remittances, Zonal Models

## Zone 3

1

## Model Summary(b)

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.829(\mathrm{a})$ | .687 | .665 | 49809.98011 |  |

a Predictors: (Constant), MTHLEC, MTHMGR, MTHBANK, MTHPOL, MTHFARM, FEMHEAD female headed hh, MTHPENS, MTHREMIT, NPEOPLE \# of people earning sal or remit, WAGERATE Daily wagerate, NMTHS \# of months hh had income from sal or remit, SCH_HEAD years of schooling for hh head, ORDCINC order interacted with cash income
b Dependent Variable: VSALREM earnings from all salary and remittance

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -123480.233 | 18879.941 |  | -6.540 | .000 |
| NPEOPLE \# of people earning sal or remit | 67491.693 | 7904.948 | .453 | 8.538 | .000 |
| NMTHS \# of months hh had income from sal | 4851.124 | 1063.831 | .208 | 4.560 | .000 |
| or remit |  |  |  |  |  |
| WAGERATE Daily wagerate | 238.792 | 196.004 | .053 | 1.218 | .225 |
| SCH_HEAD years of schooling for hh head | 4142.078 | 877.734 | .241 | 4.719 | .000 |
| FEMHEAD female headed hh | 18409.472 | 11461.247 | .070 | 1.606 | .110 |
| ORDCINC order interacted with cash income | .018 | .007 | .138 | 2.476 | .014 |
| MTHREMIT | -2782.777 | 856.121 | -.154 | -3.250 | .001 |
| MTHMGR | 15439.852 | 2450.477 | .263 | 6.301 | .000 |
| MTHPENS | -3736.420 | 1452.916 | -.109 | -2.572 | .011 |
| MTHPOL | 2773.551 | 2169.673 | .054 | 1.278 | .203 |
| MTHFARM | -5072.211 | 1707.774 | -.125 | -2.970 | .003 |
| MTHBANK | 9461.554 | 2231.993 | .186 | 4.239 | .000 |
| MTHLEC | 16238.312 | 3045.265 | .226 | 5.332 | .000 |

a Dependent Variable: VSALREM earnings from all salary and remittance

Salaries and Remittances, Zonal Models
Zone 4
Model Summary(b)

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.877(\mathrm{a})$ | .768 | .748 | 32494.49230 |  |

Predictors: (Constant), MTHCHIEF, PVASST02 Unstandardized Predicted Value, MTHPOL, MTHSALES, MTHLEC, MTHDRIVE, MTHCLERK, MTHIND, FEMHEAD female headed hh, MTHCIVIL, MTHWATCH, NPEOPLE \# of people earning sal or remit, NMTHS \# of months hh had income from sal or remit, NADULT \# of adults in hh, MTHTEACH, MTHREMIT, SCH_HEAD years of schooling for hh head, ORDCINC order interacted with cash income
b Dependent Variable: VSALREM earnings from all salary and remittance

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -60008.131 | 10422.249 |  | -5.758 | .000 |
| NPEOPLE \# of people earning sal or remit | 44281.602 | 5198.729 | .338 | 8.518 | .000 |
| NMTHS \# of months hh had income from sal or | 1781.927 | 756.740 | .090 | 2.355 | .019 |
| remit |  |  |  |  |  |
| PVASST02 Unstandardized Predicted Value | .045 | .015 | .130 | 3.073 | .002 |
| NADULT \# of adults in hh | -1153.658 | 843.397 | -.050 | -1.368 | .173 |
| SCH_HEAD years of schooling for hh head | 2156.102 | 644.955 | .145 | 3.343 | .001 |
| FEMHEAD female headed hh | 27491.738 | 6337.751 | .154 | 4.338 | .000 |
| ORDCINC order interacted with cash income | .005 | .006 | .047 | .926 | .355 |
| MTHREMIT | -1337.522 | 495.348 | -.116 | -2.700 | .008 |
| MTHTEACH | 4198.708 | 681.652 | .275 | 6.160 | .000 |
| MTHDRIVE | 6945.916 | 853.261 | .300 | 8.140 | .000 |
| MTHIND | 3540.477 | 1012.836 | .122 | 3.496 | .001 |
| MTHCLERK | 4350.047 | 822.591 | .195 | 5.288 | .000 |
| MTHSALES | 5806.857 | 2445.994 | .082 | 2.374 | .019 |
| MTHPOL | 7548.091 | 1969.559 | .131 | 3.832 | .000 |
| MTHWATCH | 1645.652 | 928.100 | .063 | 1.773 | .078 |
| MTHCIVIL | 5656.192 | 1631.649 | .120 | 3.467 | .001 |
| MTHLEC | 17056.082 | 2793.007 | .210 | 6.107 | .000 |
| MTHCHIEF | 8700.752 | 1281.186 | .238 | 6.791 | .000 |

[^16]
## CONDITIONAL MODELS

## A. Retained Cereals and Tubers, Conditional Models

## Per Capita Income Quintile 1

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | :---: | :---: |
| $.847(\mathrm{a})$ | .718 | .697 | 3870.36598 |  |

a Predictors: (Constant), PRODYR3, ZEROQRET nzerohrv interacted w/ qkeyret, STPOTRET, ARROWRET, SCH_HEAD years of schooling for hh head, QKEYRGRM qkeyret interacted with green maize, QKEYRSO qkeyret interacted with sorghum, HHSIZE hh size, PVASSET3, QKEYRRI qkeyret interacted with rice, QKEYRGRG qkeyret interacted with greengrams, ORDCOMP order interacted with ecompare, NDAMAGE number of ctp damaged, FEMHEAD2, HLBRYES2, NCTPQRET nctp interacted w/ qkeyret, PRODYR2, TACRES3, TACRES2

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | 1107.181 | 939.679 |  | 1.178 | .240 |
| NCTPQRET nctp interacted w/ qkeyret | 1.853 | .104 | .803 | 17.778 | .000 |
| QKEYRRI qkeyret interacted with rice | -5.523 | 1.723 | -.119 | -3.204 | .002 |
| QKEYRGRM qkeyret interacted with green | 4.193 | 2.491 | .061 | 1.683 | .094 |
| maize |  |  |  |  |  |
| QKEYRGRG $\quad$ qkeyret interacted with | 9.572 | 3.286 | .103 | 2.913 | .004 |
| greengrams |  |  |  |  |  |
| QKEYRSO qkeyret interacted with sorghum | 5.920 | 3.289 | .064 | 1.800 | .073 |
| STPOTRET | -1433.536 | 608.864 | -.083 | -2.354 | .019 |
| ARROWRET | -13267.030 | 4046.180 | -.115 | -3.279 | .001 |
| ZEROQRET nzerohrv interacted w/ qkeyret | -.344 | .088 | -.159 | -3.905 | .000 |
| NDAMAGE number of ctp damaged | -247.766 | 80.148 | -.118 | -3.091 | .002 |
| HHSIZE hh size | 333.393 | 70.542 | .176 | 4.726 | .000 |
| FEMHEAD2 | -1544.608 | 785.798 | -.079 | -1.966 | .050 |
| ORDCOMP order interacted with ecompare | 150.702 | 72.840 | .078 | 2.069 | .040 |
| PVASSET3 | -.011 | .004 | -.120 | -2.737 | .007 |
| SCH_HEAD years of schooling for hh head | -123.793 | 66.962 | -.065 | -1.849 | .066 |
| HLBRYES2 | -3359.027 | 751.163 | -.184 | -4.472 | .000 |
| TACRES2 | -450.735 | 185.704 | -.120 | -2.427 | .016 |
| TACRES3 | -648.578 | 228.837 | -.137 | -2.834 | .005 |
| PRODYR2 | 879.316 | 319.692 | .131 | 2.751 | .006 |
| PRODYR3 | 2.206 | 1.491 | .053 | 1.480 | .140 |

a Dependent Variable: VRETCTP

## Per Capita Income Quintile 2

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.737(\mathrm{a})$ | .544 | .515 | 6422.47658 |  |

a Predictors: (Constant), FERTAREA fertyes interacted w/ tacres, QKEYRRI qkeyret interacted with rice, QKEYRARR qkeyret interacted with arrowroots, IRPOTRET, FEMHEAD1, NSOLD2, NSOLD1, QKEYRET quant of prodn of key retained crop based on quantity retained approach, FERTYES1, NZEROHRV \# of crops w/ failed harvest, FEMHEAD female headed hh, NDAMAGE number of ctp damaged, TACRES3, NCTP number of ctp produced, LBRQRET hlbryes interacted w/ qkeyret, FERTQRET fertyes interacted w/ qkeyret

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | 2165.438 | 1080.254 |  | 2.005 | .046 |
| QKEYRET quant of prodn of key retained crop | 11.742 | 1.011 | 1.388 | 11.620 | .000 |
| based on quantity retained approach |  |  |  |  |  |
| QKEYRARR qkeyret interacted with arrowroots | 9.846 | 3.206 | .131 | 3.071 | .002 |
| QKEYRRI qkeyret interacted with rice | -5.022 | 1.993 | -.112 | -2.520 | .012 |
| NCTP number of ctp produced | 978.717 | 150.730 | .436 | 6.493 | .000 |
| NDAMAGE number of ctp damaged | -718.582 | 145.895 | -.332 | -4.925 | .000 |
| NZEROHRV \# of crops w/ failed harvest | -213.251 | 153.815 | -.068 | -1.386 | .167 |
| LBRQRET hlbryes interacted w/ qkeyret | -2.651 | .707 | -.311 | -3.751 | .000 |
| FERTQRET fertyes interacted w/ qkeyret | -5.432 | .989 | -.663 | -5.492 | .000 |
| FEMHEAD female headed hh | -2113.191 | 1346.505 | -.079 | -1.569 | .118 |
| FEMHEAD1 | 4096.988 | 2561.587 | .084 | 1.599 | .111 |
| TACRES3 | -234.330 | 153.602 | -.098 | -1.526 | .128 |
| NSOLD1 | 1497.717 | 446.862 | .163 | 3.352 | .001 |
| NSOLD2 | -830.170 | 340.769 | -.111 | -2.436 | .016 |
| FERTYES1 | -7792.997 | 2269.495 | -.159 | -3.434 | .001 |
| IRPOTRET | -3161.820 | 1865.741 | -.073 | -1.695 | .091 |
| FERTAREA fertyes interacted w/ tacres | 259.330 | 122.329 | .134 | 2.120 | .035 |

a Dependent Variable: VRETCTP

## Per Capita Income Quintile 3

## Model Summary

| $R$ | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.794(\mathrm{a})$ | .631 | .606 | 7254.91856 |  |

a Predictors: (Constant), STPOTRET, NCTPQRET nctp interacted w/ qkeyret, FEMHEAD3, NDAMAGE2, NZEROHRV \# of crops w/ failed harvest, NDAMAGE3, FEMHEAD2, TACRES1, QKEYRIP qkeyret interacted with irishpotatoes, NCTP number of ctp produced, TACRES2, QKEYRSTP qkeyret interacted with sweetpotatoes, NDAMAGE1, LBRQRET hlbryes interacted w/ qkeyret, NSLDQRET nsold interacted w/ qkeyret, FERTQRET fertyes interacted w/ qkeyret, QKEYRET quant of prodn of key retained crop based on quantity retained approach

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (Constant) | -203.055 | 1467.991 |  | -. 138 | . 890 |
| NCTPQRET nctp interacted w/ qkeyret | . 357 | . 148 | . 311 | 2.419 | . 016 |
| NCTP number of ctp produced | 924.006 | 172.438 | . 327 | 5.358 | . 000 |
| QKEYRET quant of prodn of key retained crop based on quantity retained approach | 10.284 | 1.372 | 1.379 | 7.496 | . 000 |
| QKEYRIP qkeyret interacted with irishpotatoes | -3.070 | . 584 | -. 236 | -5.255 | . 000 |
| QKEYRSTP qkeyret interacted with sweetpotatoes | 5.840 | 1.661 | . 191 | 3.517 | . 001 |
| NDAMAGE1 | -471.003 | 230.031 | -. 136 | -2.048 | . 042 |
| NDAMAGE2 | -1479.663 | 309.362 | -. 242 | -4.783 | . 000 |
| NDAMAGE3 | -433.646 | 279.976 | -. 065 | -1.549 | . 123 |
| NZEROHRV \# of crops w/ failed harvest | -319.884 | 127.768 | -. 104 | -2.504 | . 013 |
| NSLDQRET nsold interacted w/ qkeyret | -. 722 | . 173 | -. 359 | -4.174 | . 000 |
| FERTQRET fertyes interacted w/ qkeyret | -3.660 | . 892 | -. 496 | -4.105 | . 000 |
| LBRQRET hlbryes interacted w/ qkeyret | -2.369 | . 721 | -. 325 | -3.285 | . 001 |
| TACRES2 | 1132.241 | 195.933 | . 313 | 5.779 | . 000 |
| FEMHEAD2 | -5837.639 | 3124.497 | -. 080 | -1.868 | . 063 |
| FEMHEAD3 | 6978.404 | 2863.666 | . 096 | 2.437 | . 016 |
| TACRES1 | 463.801 | 220.088 | . 134 | 2.107 | . 036 |
| STPOTRET | -3436.711 | 2118.583 | -. 086 | -1.622 | . 106 |

[^17]
## Per Capita Income Quintile 4

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.938(\mathrm{a})$ | .881 | .871 | 11926.94056 |  |

a Predictors: (Constant), YAMSRET, LBRQRET hlbryes interacted w/ qkeyret, NZERO1, QKEYRSTP qkeyret interacted with sweetpotatoes, QKEYRWH qkeyret interacted with wheat, PVASSET2, ORDCOMP order interacted with ecompare, FERTYES Used fertilizer, NCTP number of ctp produced, NSOLD3, HLBRYES used hired labour, HLBRYES1, QKEYRYA qkeyret interacted with yams, NDAMAGE3, TACRES2, SCHHEAD3, FERTQRET fertyes interacted w/ qkeyret, TACRES1, NCTPQRET nctp interacted $w /$ qkeyret, NSLDQRET nsold interacted $w /$ qkeyret, QKEYRET quant of prodn of key retained crop based on quantity retained approach

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (Constant) | -12531.813 | 4004.458 |  | -3.129 | . 002 |
| NCTPQRET nctp interacted w/ qkeyret | . 464 | . 134 | . 263 | 3.466 | . 001 |
| NCTP number of ctp produced | 759.393 | 269.015 | . 087 | 2.823 | . 005 |
| QKEYRET quant of prodn of key retained crop based on quantity retained approach | 21.120 | 1.408 | 1.683 | 15.001 | . 000 |
| QKEYRYA qkeyret interacted with yams | 14.414 | 2.375 | . 192 | 6.069 | . 000 |
| QKEYRWH qkeyret interacted with wheat | 4.125 | 1.900 | . 050 | 2.171 | . 031 |
| QKEYRSTP qkeyret interacted with sweetpotatoes | -4.154 | 1.620 | -. 066 | -2.564 | . 011 |
| NDAMAGE3 | -1158.530 | 597.862 | -. 060 | -1.938 | . 054 |
| NZERO1 | -412.516 | 223.380 | -. 044 | -1.847 | . 066 |
| FERTQRET fertyes interacted w/ qkeyret | -12.765 | . 781 | -. 879 | -16.336 | . 000 |
| LBRQRET hlbryes interacted w/ qkeyret | -5.285 | . 823 | -. 414 | -6.423 | . 000 |
| NSLDQRET nsold interacted w/ qkeyret | -1.276 | . 237 | -. 314 | -5.381 | . 000 |
| ORDCOMP order interacted with ecompare | 303.977 | 203.630 | . 035 | 1.493 | . 137 |
| SCHHEAD3 | -588.410 | 245.135 | -. 078 | -2.400 | . 017 |
| TACRES2 | 659.739 | 414.126 | . 048 | 1.593 | . 112 |
| PVASSET2 | -. 019 | . 014 | -. 040 | -1.373 | . 171 |
| TACRES1 | 1397.266 | 302.214 | . 192 | 4.623 | . 000 |
| FERTYES Used fertilizer | 10858.974 | 2085.146 | . 141 | 5.208 | . 000 |
| HLBRYES1 | -14043.108 | 4373.504 | -. 111 | -3.211 | . 001 |
| NSOLD3 | 3073.141 | 746.734 | . 134 | 4.115 | . 000 |
| HLBRYES used hired labour | 3824.161 | 2006.895 | . 058 | 1.906 | . 058 |
| YAMSRET | -17159.120 | 5921.688 | -. 082 | -2.898 | . 004 |

[^18]
## Per Capita Income Quintile 5

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.900(\mathrm{a})$ | .810 | .795 | 13009.44416 |  |

a Predictors: (Constant), FERTYES3, QKEYRPIP qkeyret interacted with pigeon peas, QKEYRCOW qkeyret interacted with cowpeas, QKEYRSTP qkeyret interacted with sweetpotatoes, NSOLD number of ctp sold, PRODYR3, ORDCOMP order interacted with ecompare, QKEYRIP qkeyret interacted with irishpotatoes, FERTYES Used fertilizer, TACRES1, DMGQRET ndamage interacted w/ qkeyret, LBRQRET hlbryes interacted w/ qkeyret, NSOLD1, NDAMAGE3, NSOLD3, ZEROQRET nzerohrv interacted w/ qkeyret, NSLDQRET nsold interacted w/ qkeyret, QKEYRET quant of prodn of key retained crop based on quantity retained approach, NCTPQRET nctp interacted w/ qkeyret

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | 2222.803 | 3584.807 |  | .620 | .536 |
| NCTPQRET nctp interacted w/ qkeyret | .378 | .102 | .532 | 3.719 | .000 |
| QKEYRET quant of prodn of key retained crop | 3.224 | .653 | .634 | 4.938 | .000 |
| based on quantity retained approach |  |  |  |  |  |
| QKEYRPIP qkeyret interacted with pigeon peas | 13.376 | 1.178 | .349 | 11.357 | .000 |
| QKEYRCOW qkeyret interacted with cowpeas | 27.514 | 3.855 | .395 | 7.137 | .000 |
| QKEYRSTP qkeyret interacted with sweetpotatoes | 4.682 | .532 | .454 | 8.796 | .000 |
| QKEYRIP qkeyret interacted with irishpotatoes | -2.721 | .645 | -.171 | -4.217 | .000 |
| ZEROQRET nzerohrv interacted w/ qkeyret | -.872 | .310 | -.238 | -2.810 | .005 |
| PRODYR3 | 8.122 | 4.081 | .062 | 1.990 | .048 |
| NDAMAGE3 | -1845.813 | 740.278 | -.109 | -2.493 | .013 |
| LBRQRET hlbryes interacted w/ qkeyret | -1.780 | .387 | -.338 | -4.594 | .000 |
| NSLDQRET nsold interacted w/ qkeyret | -.545 | .143 | -.469 | -3.812 | .000 |
| DMGQRET ndamage interacted w/ qkeyret | .223 | .074 | .145 | 3.007 | .003 |
| ORDCOMP order interacted with ecompare | 387.871 | 235.220 | .050 | 1.649 | .100 |
| TACRES1 | 352.758 | 179.058 | .082 | 1.970 | .050 |
| NSOLD number of ctp sold | 1250.989 | 535.145 | .103 | 2.338 | .020 |
| NSOLD1 | -2151.921 | 884.972 | -.108 | -2.432 | .016 |
| NSOLD3 | 1498.252 | 820.180 | .096 | 1.827 | .069 |
| FERTYES Used fertilizer | 4495.063 | 2780.637 | .054 | 1.617 | .107 |
| FERTYES3 | -6598.913 | 3301.621 | -.108 | -1.999 | .047 |

a Dependent Variable: VRETCTP

## B. Sold Cereals and Tubers, Conditional Models

## Per Capita Income Quintile 1

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.911(\mathrm{a})$ | .829 | .818 | 3382.50221 |  |

a Predictors: (Constant), WHTSLD, FEMHEAD3, NSOLD1, RICESLD, NCTPQSLD, ORDCOMP3, DMGQSLD, NDAMAGE3, NSLDQSLD, QKEYSWH qkeysold interacted with wheat, QKEYSOLD quant of prodn of key sales crop based on value sold approach

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | 318.264 | 358.815 |  | .887 | .376 |
| NCTPQSLD | -.478 | .105 | -.350 | -4.551 | .000 |
| NSOLD1 | 702.552 | 387.915 | .065 | 1.811 | .072 |
| NSLDQSLD | 2.800 | .260 | .699 | 10.767 | .000 |
| ORDCOMP3 | 246.810 | 130.865 | .109 | 1.886 | .061 |
| FEMHEAD3 | 2349.659 | 1692.940 | .055 | 1.388 | .167 |
| NDAMAGE3 | -454.462 | 327.410 | -.076 | -1.388 | .167 |
| DMGQSLD | -.232 | .144 | -.086 | -1.617 | .108 |
| QKEYSOLD quant of prodn of key sales crop | 3.519 | .954 | .362 | 3.689 | .000 |
| based on value sold approach |  |  |  |  |  |
| QKEYSWH qkeysold interacted with wheat | 11.913 | 2.106 | .417 | 5.657 | .000 |
| RICESLD | 7974.002 | 1290.590 | .238 | 6.179 | .000 |
| WHTSLD | -5126.719 | 2887.690 | -.129 | -1.775 | .078 |

a Dependent Variable: VSOLDCTP

Sold Cereals and Tubers, Conditional Models

## Per Capita Income Quintile 2

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.912(\mathrm{a})$ | .832 | .824 | 5503.70591 |  |

a Predictors: (Constant), QKEYSRI qkeysold interacted with rice, QKEYSWH qkeysold interacted with wheat, PRODYEAR Farmer's view about production year 1999/2000, NSOLD number of ctp sold, NCTPQSLD, LBRQSLD, NSLDQSLD, QKEYSOLD quant of prodn of key sales crop based on value sold approach

## Coefficients(a)

|  | B | Std. Error | Beta | t | $\operatorname{sig}$ |
| :--- | :--- | ---: | ---: | ---: | :---: |
| (Constant) | -1709.209 | 1065.173 |  | -1.605 | .111 |
| NCTPQSLD | -.155 | .077 | -.114 | -2.003 | .047 |
| NSOLD number of ctp sold | 585.981 | 333.982 | .087 | 1.755 | .081 |
| NSLDQSLD | 1.238 | .226 | .414 | 5.487 | .000 |
| PRODYEAR Farmer's view about production year | 2.304 | 1.429 | .052 | 1.612 | .109 |
| 1999/2000 |  |  |  |  |  |
| LBRQSLD | -1.340 | .639 | -.155 | -2.098 | .037 |
| QKEYSOLD quant of prodn of key sales crop | 5.477 | .908 | .596 | 6.030 | .000 |
| based on value sold approach |  |  |  |  |  |
| QKEYSWH qkeysold interacted with wheat | 5.337 | .760 | .242 | 7.026 | .000 |
| QKEYSRI qkeysold interacted with rice | 8.022 | 1.013 | .275 | 7.920 | .000 |

a Dependent Variable: VSOLDCTP

Sold Cereals and Tubers, Conditional Models

## Per Capita Income Quintile 3

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.954(\mathrm{a})$ | .910 | .905 | 6874.22468 |  |

a Predictors: (Constant), QKEYSSTP qkeysold interacted with sweetpotatoes, NCTPQSLD, QKEYSMI qkeysold interacted with millet, QKEYSCA qkeysold interacted with cassava, QKEYSWH qkeysold interacted with wheat, DMGQSLD, QKEYSOLD quant of prodn of key sales crop based on value sold approach, NSLDQSLD

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | 325.463 | 708.620 |  | .459 | .647 |
| NCTPQSLD | -.296 | .120 | -.182 | -2.464 | .015 |
| NSLDQSLD | .998 | .166 | .300 | 6.023 | .000 |
| DMGQSLD | .213 | .109 | .074 | 1.954 | .052 |
| QKEYSOLD quant of prodn of key sales crop | 6.419 | .446 | .693 | 14.407 | .000 |
| based on value sold approach |  |  |  |  |  |
| QKEYSWH qkeysold interacted with wheat | 4.847 | .530 | .255 | 9.141 | .000 |
| QKEYSMI qkeysold interacted with millet | 14.106 | 3.078 | .109 | 4.583 | .000 |
| QKEYSCA qkeysold interacted with cassava | -4.790 | 1.458 | -.088 | -3.286 | .001 |
| QKEYSSTP qkeysold interacted with | -3.790 | 1.120 | -.080 | -3.384 | .001 |
| sweetpotatoes |  |  |  |  |  |

a Dependent Variable: VSOLDCTP

Sold Cereals and Tubers, Conditional Models

## Per Capita Income Quintile 4

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.886(\mathrm{a})$ | .786 | .774 | 13237.31784 |  |

a Predictors: (Constant), QKEYSGNT qkeysold interacted with groundnuts, QKEYSWH qkeysold interacted with wheat, LBRQSLD, FERTYES Used fertilizer, NSOLD number of ctp sold, ORDCOMP3, TACRES total acres cultivated, FERTQSLD, QKEYSOLD quant of prodn of key sales crop based on value sold approach

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -889.414 | 3097.167 |  | -.287 | .774 |
| NSOLD number of ctp sold | 2666.759 | 612.548 | .173 | 4.354 | .000 |
| ORDCOMP3 | 384.549 | 185.127 | .090 | 2.077 | .039 |
| TACRES total acres cultivated | 377.436 | 168.906 | .096 | 2.235 | .027 |
| FERTYES Used fertilizer | -9584.873 | 3141.288 | -.132 | -3.051 | .003 |
| FERTQSLD | 7.456 | .847 | .710 | 8.803 | .000 |
| LBRQSLD | 2.540 | .880 | .269 | 2.888 | .004 |
| QKEYSOLD quant of prodn of key sales crop | -1.922 | 1.134 | -.199 | -1.695 | .092 |
| based on value sold approach |  |  |  |  |  |
| QKEYSWH qkeysold interacted with wheat | 5.476 | 1.345 | .158 | 4.071 | .000 |
| QKEYSGNT qkeysold interacted with | 50.184 | 14.829 | .129 | 3.384 | .001 |
| groundnuts |  |  |  |  |  |

a Dependent Variable: VSOLDCTP

Sold Cereals and Tubers, Conditional Models

## Per Capita Income Quintile 5

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.957(\mathrm{a})$ | .916 | .911 | 25278.51185 |  |

a Predictors: (Constant), BNSSLD, SCH_HEAD years of schooling for hh head, QKEYSWH qkeysold interacted with wheat, QKEYSIP qkeysold interacted with irish potatoes, ORDCOMP order interacted with ecompare, PVASST02 Unstandardized Predicted Value, FERTQSLD, NSLDQSLD, NCTPQSLD, QKEYSOLD quant of prodn of key sales crop based on value sold approach

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -8554.964 | 8158.553 |  | -1.049 | .296 |
| NCTPQSLD | -.301 | .163 | -.159 | -1.850 | .066 |
| NSLDQSLD | 1.908 | .214 | .660 | 8.923 | .000 |
| ORDCOMP order interacted with ecompare | 1084.746 | 577.025 | .046 | 1.880 | .062 |
| SCH_HEAD years of schooling for hh head | -876.680 | 421.371 | -.051 | -2.081 | .039 |
| PVASST02 Unstandardized Predicted Value | .010 | .007 | .036 | 1.340 | .182 |
| FERTQSLD | -2.875 | 1.250 | -.226 | -2.301 | .023 |
| QKEYSOLD quant of prodn of key sales crop | 7.194 | 1.626 | .565 | 4.423 | .000 |
| based on value sold approach |  | .701 | .227 | 8.187 | .000 |
| QKEYSWH qkeysold interacted with wheat | 5.736 | .949 | -.084 | -2.779 | .006 |
| QKEYSIP qkeysold interacted with irish <br> potatoes | -2.637 |  |  |  |  |
| BNSSLD | 11343.470 | 7490.660 | .036 | 1.514 | .132 |

a Dependent Variable: VSOLDCTP

## C. Retained f\&v, Conditional Models

## Per Capita Income Quintile 1

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.704(\mathrm{a})$ | .496 | .450 | 4070.45399 |  |

a Predictors: (Constant), CPLVSRET, QKEYRTO qkeyret interacted w/ tomato, QKEYROR qkeyret interacted w/ orange, QKEYRCC qkeyret interacted w/ coconut, ZEROQRET nzerohrv interacted w/ qkeyret, QKEYRMG qkeyret interacted w/ mango, SUKRET, NFV3, AVOCRET, NADULT \# of adults in hh, PRODYEAR Farmer's view about production year 1999/2000, NDAMAGE1, FERTYES3, ORNGRET, NADULT2, NZERO1, COCORET, NSLDQRET nsold interacted w/ qkeyret, NFV1, NADULT3, NFVQRET nfv interacted w/ qkeyret, QKEYRET quant of prodn of key retained crop based on quantity retained approach

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | 595.810 | 691.944 |  | .861 | .390 |
| NFV1 | 404.104 | 166.192 | .248 | 2.432 | .016 |
| NFV3 | 724.563 | 208.082 | .275 | 3.482 | .001 |
| NFVQRET nfv interacted w/ qkeyret | .462 | .162 | .554 | 2.847 | .005 |
| NSLDQRET nsold interacted w/ qkeyret | -.464 | .136 | -.343 | -3.405 | .001 |
| NADULT \# of adults in hh | 726.454 | 131.278 | .383 | 5.534 | .000 |
| NADULT2 | -524.020 | 139.852 | -.294 | -3.747 | .000 |
| NADULT3 | -807.254 | 186.439 | -.452 | -4.330 | .000 |
| NDAMAGE1 | -970.161 | 239.074 | -.334 | -4.058 | .000 |
| NZERO1 | 285.508 | 126.676 | .154 | 2.254 | .025 |
| ZEROQRET nzerohrv interacted w/ qkeyret | -.368 | .069 | -.552 | -5.370 | .000 |
| PRODYEAR Farmer's view about production | 1.363 | .995 | .088 | 1.370 | .172 |
| year 1999/2000 |  |  |  |  |  |
| FERTYES3 | -2384.583 | 1030.795 | -.144 | -2.313 | .022 |
| QKEYRET quant of prodn of key retained crop | 4.359 | 1.307 | .659 | 3.335 | .001 |
| based on quantity retained approach |  |  |  |  |  |
| QKEYROR qkeyret interacted w/ orange | 5.951 | 2.724 | .141 | 2.184 | .030 |
| QKEYRTO qkeyret interacted w/ tomato | -3.713 | 2.010 | -.095 | -1.847 | .066 |
| QKEYRMG qkeyret interacted w/ mango | -3.987 | .893 | -.505 | -4.465 | .000 |
| QKEYRCC qkeyret interacted w/ coconut | -5.724 | 1.569 | -.292 | -3.648 | .000 |
| AVOCRET | -1325.081 | 967.230 | -.068 | -1.370 | .172 |
| COCORET | -2996.455 | 2197.490 | -.099 | -1.364 | .174 |
| SUKRET | -1858.316 | 959.961 | -.092 | -1.936 | .054 |
| ORNGRET | -2804.159 | 1788.799 | -.098 | -1.568 | .118 |
| CPLVSRET | -1879.470 | 976.321 | -.093 | -1.925 | .055 |

[^19]
## Retained f\&v, Conditional Models

## Per Capita Income Quintile 2

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | :---: | :---: |
| $.623(\mathrm{a})$ | .388 | .346 | 5099.85909 |  |

a Predictors: (Constant), GUAVARET, HLBRYES used hired labour, FEMHEAD3, QKEYRMG qkeyret interacted w/ mango, QKEYROR qkeyret interacted w/ orange, QKEYRCB qkeyret interacted w/ cabbage, PVASSET2, TACRES total cropped acres, NSOLD number of f\&v sold, NDAMAGE number of f\&v damaged, FERTYES3, TACRES1, NFV number of f\&v produced, HLBRYES3, TACRES3, QKEYRGV qkeyret interacted w/ guava, QKEYRET quant of prodn of key retained crop based on quantity retained approach

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | 43.653 | 845.317 |  | .052 | .959 |
| NFV number of f\&v produced | 821.222 | 123.125 | .422 | 6.670 | .000 |
| NSOLD number of f\&v sold | -358.080 | 199.329 | -.108 | -1.796 | .074 |
| PVASSET2 | -.008 | .006 | -.070 | -1.290 | .198 |
| FEMHEAD3 | 3380.616 | 1526.996 | .116 | 2.214 | .028 |
| TACRES total cropped acres | 163.347 | 87.889 | .141 | 1.859 | .064 |
| TACRES1 | -337.760 | 127.113 | -.174 | -2.657 | .008 |
| TACRES3 | -240.567 | 121.826 | -.157 | -1.975 | .049 |
| NDAMAGE number of f\&v damaged | -227.978 | 145.000 | -.089 | -1.572 | .117 |
| FERTYES3 | -1682.920 | 921.728 | -.109 | -1.826 | .069 |
| HLBRYES used hired labour | -4011.191 | 1734.334 | -.147 | -2.313 | .022 |
| HLBRYES3 | 10079.743 | 3139.546 | .218 | 3.211 | .002 |
| QKEYRET quant of prodn of key retained crop | 3.553 | .625 | .599 | 5.689 | .000 |
| based on quantity retained approach |  |  |  |  |  |
| QKEYRGV qkeyret interacted $\mathrm{w} /$ guava | 5.912 | 5.302 | .097 | 1.115 | .266 |
| QKEYRMG qkeyret interacted w/ mango | -1.877 | .673 | -.287 | -2.790 | .006 |
| QKEYROR qkeyret interacted w/ orange | -2.751 | 1.615 | -.090 | -1.704 | .090 |
| QKEYRCB qkeyret interacted w/ cabbage | -3.891 | 2.395 | -.088 | -1.624 | .106 |
| GUAVARET | -3386.567 | 2436.592 | -.120 | -1.390 | .166 |

[^20]
## Retained f\&v, Conditional Models

## Per Capita Income Quintile 3

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.692(\mathrm{a})$ | .479 | .440 | 7106.16639 |  |

Predictors: (Constant), COCORET, NZERO1, QKEYRTO qkeyret interacted w/ tomato, QKEYRMG qkeyret interacted w/ mango, QKEYRCB qkeyret interacted w/ cabbage, PAPARET, NDAMAGE2, AVOCRET, FERTYES3, SUKRET, NFV number of f\&v produced, LBRQRET hlbryes interacted w/ qkeyret, NDAMAGE1, PRODYR2, NZEROHRV, QKEYRET quant of prodn of key retained crop based on quantity retained approach, TACRES2, NFV2

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | 1488.035 | 1241.817 |  | 1.198 | .232 |
| NFV number of f\&v produced | 729.113 | 135.335 | .308 | 5.387 | .000 |
| NFV2 | 940.804 | 382.681 | .265 | 2.458 | .015 |
| TACRES2 | 515.502 | 245.997 | .175 | 2.096 | .037 |
| NDAMAGE1 | -297.175 | 215.024 | -.084 | -1.382 | .168 |
| NDAMAGE2 | -1333.984 | 452.786 | -.193 | -2.946 | .004 |
| NZEROHRV | -268.949 | 159.151 | -.102 | -1.690 | .092 |
| NZERO1 | 370.653 | 251.449 | .094 | 1.474 | .142 |
| PRODYR2 | -2661.496 | 983.947 | -.252 | -2.705 | .007 |
| FERTYES3 | -2918.801 | 1220.145 | -.120 | -2.392 | .018 |
| LBRQRET hlbryes interacted w/ qkeyret | 1.924 | 1.217 | .087 | 1.582 | .115 |
| QKEYRET quant of prodn of key retained crop | 4.257 | .455 | .721 | 9.356 | .000 |
| based on quantity retained approach |  |  |  |  |  |
| QKEYRMG qkeyret interacted w/ mango | -3.545 | .565 | -.476 | -6.278 | .000 |
| QKEYRCB qkeyret interacted w/ cabbage | -7.162 | 1.459 | -.260 | -4.908 | .000 |
| QKEYRTO qkeyret interacted w/ tomato | -5.478 | 3.387 | -.080 | -1.617 | .107 |
| AVOCRET | -2239.439 | 1326.861 | -.087 | -1.688 | .093 |
| PAPARET | -4553.089 | 2283.584 | -.096 | -1.994 | .047 |
| SUKRET | -3201.077 | 1323.157 | -.121 | -2.419 | .016 |
| COCORET | -6958.581 | 3122.404 | -.118 | -2.229 | .027 |

a Dependent Variable: VRETFV

## Retained f\&v, Conditional Models

## Per Capita Income Quintile 4

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.780(\mathrm{a})$ | .609 | .575 | 9525.45208 |  |

a Predictors: (Constant), INDIGRET, FEMHEAD female headed hh, NSLDQRET nsold interacted w/ qkeyret, NZERO3, QKEYRTO qkeyret interacted w/ tomato, QKEYRSU qkeyret interacted w/ sukuma, QKEYRCB qkeyret interacted w/ cabbage, QKEYRMG qkeyret interacted w/ mango, NSOLD2, HLBRYES1, NDAMAGE1, PVASSET2, NSOLD3, QKEYRIV qkeyret interacted $\mathrm{w} /$ indigveg, ZEROQRET nzerohrv interacted $\mathrm{w} / \mathrm{qkeyret}$, NSOLD number of $\mathrm{f} \& \mathrm{v}$ sold, ORDCOMP1, NADULT2, NSOLD1, QKEYRAV qkeyret interacted w/ avocado, QKEYRET quant of prodn of key retained crop based on quantity retained approach

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | 540.867 | 1029.681 |  | .525 | .600 |
| NSOLD number of f\&v sold | 1533.186 | 281.207 | .348 | 5.452 | .000 |
| NSOLD1 | 2368.357 | 600.629 | .334 | 3.943 | .000 |
| NSOLD2 | -1456.871 | 507.690 | -.163 | -2.870 | .004 |
| NSOLD3 | -1037.708 | 367.781 | -.149 | -2.822 | .005 |
| NSLDQRET nsold interacted w/ qkeyret | -.353 | .078 | -.564 | -4.529 | .000 |
| NADULT2 | 880.556 | 337.865 | .165 | 2.606 | .010 |
| PVASSET2 | -.018 | .011 | -.084 | -1.571 | .117 |
| ORDCOMP1 | -374.309 | 226.134 | -.111 | -1.655 | .099 |
| FEMHEAD female headed hh | 5450.096 | 1833.029 | .122 | 2.973 | .003 |
| NDAMAGE1 | 594.896 | 402.631 | .088 | 1.478 | .141 |
| NZERO3 | 509.234 | 297.429 | .076 | 1.712 | .088 |
| ZEROQRET nzerohrv interacted w/ qkeyret | -.337 | .163 | -.109 | -2.065 | .040 |
| HLBRYES1 | -11993.027 | 4771.943 | -.132 | -2.513 | .013 |
| QKEYRET quant of prodn of key retained crop | 10.316 | .879 | 2.255 | 11.729 | .000 |
| based on quantity retained approach |  |  |  |  |  |
| QKEYRMG qkeyret interacted w/ mango | -6.806 | 1.640 | -.184 | -4.149 | .000 |
| QKEYRAV qkeyret interacted w/ avocado | -7.341 | .739 | -1.553 | -9.936 | .000 |
| QKEYRCB qkeyret interacted w/ cabbage | -7.656 | 1.476 | -.240 | -5.186 | .000 |
| QKEYRTO qkeyret interacted w/ tomato | -7.560 | 2.015 | -.164 | -3.752 | .000 |
| QKEYRSU qkeyret interacted w/ sukuma | -7.432 | 1.614 | -.205 | -4.604 | .000 |
| QKEYRIV qkeyret interacted w/ indigveg | 6.976 | 3.018 | .118 | 2.312 | .022 |
| INDIGRET | -6090.858 | 4371.731 | -.071 | -1.393 | .165 |

[^21]
## Retained f\&v, Conditional Models

## Per Capita Income Quintile 5

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | :---: | :---: | :---: |
| $.849(\mathrm{a})$ | .721 | .699 | 9591.50849 |  |

a Predictors: (Constant), COCORET, FEMHEAD2, FEMHEAD1, QKEYRPU qkeyret interacted w/ pumpkin, QKEYRCB qkeyret interacted w/ cabbage, FERTYES3, SCH_HEAD years of schooling for hh head, FERTQRET fertyes interacted w/ qkeyret, HLBRYES used hired labour, FERTYES1, NFV number of f\&v produced, PVASSET1, HLBRYES3, QKEYRCC qkeyret interacted w/ coconut, NDAMAGE1, NFVQRET nfv interacted w/ qkeyret, PRODYR1, ORDCOMP1, QKEYRET quant of prodn of key retained crop based on quantity retained approach

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -1916.317 | 1743.486 |  | -1.099 | .273 |
| NFV number of f\&v produced | 1186.232 | 176.170 | .288 | 6.733 | .000 |
| NFVQRET nfv interacted w/ qkeyret | -.272 | .058 | -1.218 | -4.712 | .000 |
| ORDCOMP1 | 1659.112 | 392.149 | .394 | 4.231 | .000 |
| SCH_HEAD years of schooling for hh head | -202.865 | 128.153 | -.056 | -1.583 | .115 |
| PVASSET1 | -.021 | .007 | -.162 | -3.076 | .002 |
| FEMHEAD1 | -9431.980 | 5638.286 | -.066 | -1.673 | .096 |
| FEMHEAD2 | 64929.207 | 9637.891 | .228 | 6.737 | .000 |
| NDAMAGE1 | 793.620 | 413.210 | .106 | 1.921 | .056 |
| PRODYR1 | -10669.497 | 2092.989 | -.454 | -5.098 | .000 |
| FERTYES1 | 10327.453 | 4185.811 | .137 | 2.467 | .014 |
| FERTYES3 | -3316.955 | 1525.688 | -.082 | -2.174 | .031 |
| FERTQRET fertyes interacted w/ qkeyret | -2.449 | .502 | -.430 | -4.876 | .000 |
| HLBRYES used hired labour | -2945.468 | 2039.397 | -.062 | -1.444 | .150 |
| HLBRYES3 | 9710.898 | 4143.428 | .101 | 2.344 | .020 |
| QKEYRET quant of prodn of key retained crop | 7.789 | 1.077 | 2.120 | 7.229 | .000 |
| based on quantity retained approach |  |  |  |  |  |
| QKEYRCC qkeyret interacted w/ coconut | -3.082 | .383 | -.488 | -8.046 | .000 |
| QKEYRCB qkeyret interacted w/ cabbage | -2.420 | .584 | -.160 | -4.144 | .000 |
| QKEYRPU qkeyret interacted w/ pumpkin | 3.941 | 1.326 | .107 | 2.971 | .003 |
| COCORET | 50715.778 | 9212.771 | .307 | 5.505 | .000 |

[^22]D. Sold f\&v, Conditional Models

## Per Capita Income Quintile 1

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| .621 (a) | .386 | .351 | 4980.53571 |  |

a Predictors: (Constant), QKEYSOLD quant of prodn of key sales crop based on value sold approach, NDAMAGE3, FERTYES Used fertilizer, 1 yes, 0 no, ORDCOMP order interacted with ecompare, SCH_HEAD years of schooling for hh head, NSOLD number of f\&v sold, TACRES2, PVASST02 Unstandardized Predicted Value, TACRES3, NSOLD2, NFVQSLD nfv interacted w/ qkeysold

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | :---: |
| (Constant) | -2838.255 | 1052.179 |  | -2.698 | .008 |
| NSOLD number of f\&v sold | 2003.361 | 316.634 | .516 | 6.327 | .000 |
| NSOLD2 | -1271.768 | 366.303 | -.347 | -3.472 | .001 |
| NFVQSLD nfv interacted w/ qkeysold | -.215 | .120 | -.253 | -1.793 | .075 |
| ORDCOMP order interacted with ecompare | 188.717 | 109.392 | .108 | 1.725 | .086 |
| SCH_HEAD years of schooling for hh head | -190.739 | 103.447 | -.111 | -1.844 | .067 |
| PVASST02 Unstandardized Predicted Value | -.013 | .005 | -.185 | -2.786 | .006 |
| TACRES2 | 867.497 | 272.474 | .253 | 3.184 | .002 |
| TACRES3 | -836.717 | 318.339 | -.198 | -2.628 | .009 |
| NDAMAGE3 | 1609.482 | 352.917 | .340 | 4.561 | .000 |
| FERTYES Used fertilizer, 1 yes, 0 no | 1820.711 | 852.420 | .144 | 2.136 | .034 |
| QKEYSOLD quant of prodn of key sales crop | 3.481 | .948 | .516 | 3.674 | .000 |
| based on value sold approach |  |  |  |  |  |

a Dependent Variable: VSOLDFV

Sold f\&v, Conditional Models

## Per Capita Income Quintile 2

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.781(\mathrm{a})$ | .609 | .589 | 3684.05747 |  |

a Predictors: (Constant), QKEYSSU qkeysold interacted w/ sukuma, PVASSET3, QKEYSAV qkeysold interacted w/ avocado, NSOLD number of f\&v sold, QKEYSOLD quant of prodn of key sales crop based on value sold approach, NSOLD2, FERTYES Used fertilizer, 1 yes, 0 no, LBRQSLD hlbryes interacted w/ qkeysold, NFV1, FERTQSLD fertyes interacted w/ qkeysold

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | 973.929 | 591.888 |  | 1.645 | .101 |
| NFV1 | -212.437 | 80.291 | -.159 | -2.646 | .009 |
| NSOLD number of f\&v sold | 1111.502 | 161.853 | .370 | 6.867 | .000 |
| NSOLD2 | -565.841 | 228.207 | -.139 | -2.480 | .014 |
| PVASSET3 | -.017 | .005 | -.188 | -3.789 | .000 |
| FERTYES Used fertilizer, 1 yes, 0 no | -926.470 | 678.582 | -.081 | -1.365 | .174 |
| FERTQSLD fertyes interacted w/ qkeysold | 6.028 | .845 | .716 | 7.131 | .000 |
| LBRQSLD hlbryes interacted w/ qkeysold | -2.441 | .814 | -.227 | -2.998 | .003 |
| QKEYSOLD quant of prodn of key sales crop | 1.366 | .278 | .277 | 4.916 | .000 |
| based on value sold approach |  |  |  |  |  |
| QKEYSAV qkeysold interacted w/ avocado | -6.026 | 1.009 | -.347 | -5.974 | .000 |
| QKEYSSU qkeysold interacted w/ sukuma | -3.615 | 1.004 | -.173 | -3.599 | .000 |

a Dependent Variable: VSOLDFV

Sold f\&v, Conditional Models

## Per Capita Income Quintile 3

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | :---: | :---: |
| $.663(\mathrm{a})$ | .440 | .403 | 14200.10964 |  |

a Predictors: (Constant), TOMSLD, NSOLD number of f\&v sold, PVASST02 Unstandardized Predicted Value, SCH_HEAD years of schooling for hh head, FERTYES2, QKEYSOLD quant of prodn of key sales crop based on value sold approach, HLBRYES1, CBBGSLD, NSOLD3, DMGQSLD ndamage interacted w/ qkeysold, QKEYSCB qkeysold interacted w/ cabbage, NSLDQSLD nsold interacted w/ qkeysold, NFVQSLD nfv interacted w/ qkeysold

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -3232.389 | 2788.216 |  | -1.159 | .248 |
| NFVQSLD nfv interacted w/ qkeysold | -.984 | .318 | -.535 | -3.092 | .002 |
| NSOLD number of f\&v sold | 2211.433 | 548.861 | .298 | 4.029 | .000 |
| NSOLD3 | -1284.405 | 588.876 | -.130 | -2.181 | .030 |
| NSLDQSLD nsold interacted w/ qkeysold | 2.373 | .525 | .663 | 4.519 | .000 |
| SCH_HEAD years of schooling for hh head | 346.596 | 264.490 | .075 | 1.310 | .192 |
| PVASST02 Unstandardized Predicted Value | .010 | .007 | .085 | 1.537 | .126 |
| DMGQSLD ndamage interacted w/ qkeysold | -.699 | .318 | -.187 | -2.196 | .029 |
| FERTYES2 | -4856.936 | 3475.598 | -.080 | -1.397 | .164 |
| HLBRYES1 | -9080.265 | 5678.220 | -.101 | -1.599 | .111 |
| QKEYSOLD quant of prodn of key sales crop | 7.930 | 3.017 | .411 | 2.628 | .009 |
| based on value sold approach |  |  |  |  |  |
| QKEYSCB qkeysold interacted w/ cabbage | 6.037 | 3.866 | .162 | 1.562 | .120 |
| CBBGSLD | -11988.708 | 6181.429 | -.188 | -1.939 | .054 |
| TOMSLD | -5571.376 | 3584.022 | -.085 | -1.555 | .122 |

[^23]Sold f\&v, Conditional Models

## Per Capita Income Quintile 4

## Model Summary

| $R$ | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | :---: | :---: |
| $.725(\mathrm{a})$ | .525 | .501 | 21228.13497 |  |

Predictors: (Constant), QKEYSSU qkeysold interacted w/ sukuma, QKEYSOLD quant of prodn of key sales crop based on value sold approach, PRODYR3, ORDCOMP1, NSOLD number of $f \& v$ sold, PRODYEAR Farmer's view about production year 1999/2000, DMGQSLD ndamage interacted w/ qkeysold, QKEYSAV qkeysold interacted w/ avocado, NFVQSLD nfv interacted w/ qkeysold, NSLDQSLD nsold interacted w/ qkeysold

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -1607.839 | 3019.027 |  | -.533 | .595 |
| NFVQSLD nfv interacted w/ qkeysold | -.338 | .159 | -.665 | -2.124 | .035 |
| NSOLD number of f\&v sold | 2218.318 | 621.387 | .243 | 3.570 | .000 |
| NSLDQSLD nsold interacted w/ qkeysold | 1.168 | .376 | .996 | 3.109 | .002 |
| ORDCOMP1 | 774.348 | 367.767 | .110 | 2.106 | .037 |
| DMGQSLD ndamage interacted w/ qkeysold | -.830 | .241 | -.269 | -3.448 | .001 |
| PRODYEAR Farmer's view about production | 7.486 | 5.132 | .085 | 1.459 | .146 |
| year 1999/2000 |  |  |  |  |  |
| PRODYR3 | -12.881 | 8.639 | -.085 | -1.491 | .138 |
| QKEYSOLD quant of prodn of key sales crop | 6.498 | 1.861 | .758 | 3.491 | .001 |
| based on value sold approach |  |  |  |  |  |
| QKEYSAV qkeysold interacted w/ avocado | -5.214 | 1.485 | -.552 | -3.511 | .001 |
| QKEYSSU qkeysold interacted w/ sukuma | -7.904 | 4.539 | -.087 | -1.741 | .083 |

a Dependent Variable: VSOLDFV

Sold f\&v, Conditional Models

## Per Capita Income Quintile 5

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | :---: | :---: | :---: |
| $.925(\mathrm{a})$ | .855 | .838 | 18170.76855 |  |

Predictors: (Constant), CBBGSLD, SCHHEAD2, DMGQSLD ndamage interacted w/ qkeysold, QKEYSAV qkeysold interacted w/ avocado, PVASSETI, FEMHEAD2, NDAMAGE3, LBRAREA, SCHHEAD3, NSOLD number of f\&v sold, NDAMAGE2, FERTQSLD fertyes interacted w/ qkeysold, NDAMAGE1, HLBRYES2, ORDCOMP1, QKEYSOLD quant of prodn of key sales crop based on value sold approach, NADULT1, LBRQSLD hlbryes interacted w/ qkeysold, PRODYR1, ZEROQSLD nzerohrv interacted w/ qkeysold, NFV1, NSLDQSLD nsold interacted w/ qkeysold

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | 1264.442 | 2894.416 |  | .437 | .663 |
| NFV1 | 2347.013 | 1136.292 | .229 | 2.066 | .040 |
| NSOLD number of f\&v sold | 997.080 | 559.883 | .070 | 1.781 | .077 |
| NSLDQSLD nsold interacted w/ qkeysold | 1.062 | .171 | .798 | 6.216 | .000 |
| ORDCOMP1 | 1985.928 | 808.075 | .201 | 2.458 | .015 |
| NADULT1 | -2796.764 | 1608.472 | -.122 | -1.739 | .084 |
| PVASSET1 | .017 | .012 | .055 | 1.339 | .182 |
| FEMHEAD2 | 52242.271 | 18743.638 | .080 | 2.787 | .006 |
| NDAMAGE3 | 1934.764 | 652.374 | .093 | 2.966 | .003 |
| DMGQSLD ndamage interacted w/ qkeysold | -.290 | .112 | -.273 | -2.593 | .010 |
| ZEROQSLD nzerohrv interacted w/ qkeysold | -1.134 | .201 | -.415 | -5.656 | .000 |
| SCHHEAD3 | -639.995 | 297.949 | -.068 | -2.148 | .033 |
| FERTQSLD fertyes interacted w/ qkeysold | -1.944 | .766 | -.145 | -2.538 | .012 |
| PRODYR1 | -15587.381 | 4183.231 | -.280 | -3.726 | .000 |
| LBRQSLD hlbryes interacted w/ qkeysold | 1.859 | .870 | .167 | 2.138 | .034 |
| HLBRYES2 | -53734.692 | 13526.444 | -.143 | -3.973 | .000 |
| LBRAREA | 2802.888 | 436.248 | .252 | 6.425 | .000 |
| SCHHEAD2 | 1627.225 | 662.874 | .090 | 2.455 | .015 |
| NDAMAGE1 | -1413.061 | 1097.114 | -.078 | -1.288 | .199 |
| NDAMAGE2 | -5155.265 | 3316.986 | -.050 | -1.554 | .122 |
| QKEYSAV qkeysold interacted w/ avocado | -2.822 | .978 | -.093 | -2.885 | .004 |
| QKEYSOLD quant of prodn of key sales crop | 2.687 | .611 | .313 | 4.398 | .000 |
| based on value sold approach |  |  |  |  |  |
| CBBGSLD | -5364.265 | 3671.720 | -.047 | -1.461 | .146 |

a Dependent Variable: VSOLDFV

## E. Industrial Crops,, Conditional Models

## Per Capita Income Quintile 1

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| .961 (a) | .924 | .916 | 3772.24570 |  |

a Predictors: (Constant), QKEYVPY, SCH_HEAD years of schooling for hh head, HLBRYES3, QKEYV quant of key crop based on value approach, QKEYVCF, NSOLD Number of industrial crops sold, HLBRYES2, QKEYVTE, SCHHEAD3, SCHHEAD2, NADULT3

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (Constant) | -5056.415 | 1216.645 |  | -4.156 | . 000 |
| NSOLD Number of industrial crops sold | 4514.413 | 810.192 | . 175 | 5.572 | . 000 |
| NADULT3 | -487.925 | 302.750 | -. 087 | -1.612 | . 110 |
| SCH_HEAD years of schooling for hh head | -433.973 | 129.898 | -. 110 | -3.341 | . 001 |
| SCHHEAD2 | 611.629 | 191.031 | . 127 | 3.202 | . 002 |
| SCHHEAD3 | 844.811 | 335.461 | . 131 | 2.518 | . 013 |
| HLBRYES2 | -3365.162 | 1431.605 | -. 083 | -2.351 | . 021 |
| HLBRYES3 | -7896.461 | 2676.462 | -. 109 | -2.950 | . 004 |
| QKEYV quant of key crop based on value approach | 1.642 | . 064 | . 963 | 25.761 | . 000 |
| QKEYVTE | 17.226 | 1.126 | . 569 | 15.301 | . 000 |
| QKEYVCF | 18.827 | 1.594 | . 366 | 11.808 | . 000 |
| QKEYVPY | 99.643 | 26.477 | . 124 | 3.763 | . 000 |

a Dependent Variable: VSOLDIND

Industrial Crops,, Conditional Models

## Per Capita Income Quintile 2

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.975(\mathrm{a})$ | .952 | .947 | 6469.74731 |  |

a Predictors: (Constant), QKEYVPY, HLBRYES3, TACRES2, QKEYVTE, NSOLD Number of industrial crops sold, PRODYEAR Farmer's view about production year 1999/2000, QKEYVCF, HLBRYES used hired labour, QKEYV quant of key crop based on value approach, LBRAREA hlbryes interacted with acres

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -2831.793 | 1876.953 |  | -1.509 | .134 |
| NSOLD Number of industrial crops sold | 2818.078 | 1120.569 | .059 | 2.515 | .013 |
| TACRES2 | 891.629 | 387.936 | .091 | 2.298 | .023 |
| PRODYEAR Farmer's view about production | -3.518 | 1.679 | -.050 | -2.095 | .038 |
| year 1999/2000 |  |  |  |  |  |
| HLBRYES used hired labour | 5175.913 | 1581.608 | .091 | 3.273 | .001 |
| HLBRYES3 | -10259.467 | 3593.692 | -.073 | -2.855 | .005 |
| LBRAREA hlbryes interacted with acres | -1337.385 | 270.209 | -.176 | -4.949 | .000 |
| QKEYV quant of key crop based on value | 1.509 | .062 | .753 | 24.145 | .000 |
| approach |  |  |  |  |  |
| QKEYVTE | 17.364 | .531 | .747 | 32.696 | .000 |
| QKEYVCF | 16.715 | 1.194 | .341 | 14.004 | .000 |
| QKEYVPY | 88.803 | 27.804 | .070 | 3.194 | .002 |

a Dependent Variable: VSOLDIND

## Industrial Crops,, Conditional Models

## Per Capita Income Quintile 3

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.981(\mathrm{a})$ | .962 | .959 | 8332.12558 |  |

Predictors: (Constant), COFFEE, FEMHEAD female headed hh, QKEYVPY, FERTYES3, LBRAREA hlbryes interacted with acres, NSOLD Number of industrial crops sold, SCH_HEAD years of schooling for hh head, QKEYV quant of key crop based on value approach, QKEYVCF, QKEYVTE, FEMHEAD2

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -1316.022 | 3088.520 |  | -.426 | .671 |
| NSOLD Number of industrial crops sold | 4770.199 | 1349.857 | .077 | 3.534 | .001 |
| SCH_HEAD years of schooling for hh head | -372.527 | 198.115 | -.038 | -1.880 | .063 |
| FEMHEAD female headed hh | -9990.785 | 3329.311 | -.081 | -3.001 | .003 |
| FEMHEAD2 | 11160.806 | 4811.028 | .064 | 2.320 | .022 |
| FERTYES3 | -6450.220 | 3619.936 | -.042 | -1.782 | .078 |
| LBRAREA hlbryes interacted with acres | -522.916 | 221.104 | -.048 | -2.365 | .020 |
| QKEYV quant of key crop based on value | 1.634 | .041 | 1.024 | 40.315 | .000 |
| approach |  |  |  |  |  |
| QKEYVTE | 14.884 | .732 | .517 | 20.322 | .000 |
| QKEYVCF | 27.908 | 1.609 | .421 | 17.349 | .000 |
| QKEYVPY | 59.430 | 20.720 | .056 | 2.868 | .005 |
| COFFEE | -5002.215 | 2449.220 | -.057 | -2.042 | .044 |

a Dependent Variable: VSOLDIND

## Industrial Crops,, Conditional Models

## Per Capita Income Quintile 4

## Model Summary

| $R$ | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.987(\mathrm{a})$ | .974 | .971 | 10825.31958 |  |

a Predictors: (Constant), COFFEE, PVASST02 Unstandardized Predicted Value, QKEYVPY, PRODYR3, NDAMAGE Number of industrial crops damaged, HLBRYES used hired labour, NSOLD Number of industrial crops sold, QKEYVSG, PRODYEAR Farmer's view about production year 1999/2000, NADULT3, QKEYVCF, QKEYVTE, TACRES3

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | 6719.682 | 3727.294 |  | 1.803 | .074 |
| NSOLD Number of industrial crops sold | 5856.676 | 1878.921 | .061 | 3.117 | .002 |
| NADULT3 | -6677.084 | 1251.593 | -.219 | -5.335 | .000 |
| PVASST02 Unstandardized Predicted Value | -.047 | .009 | -.100 | -5.442 | .000 |
| TACRES3 | 2794.251 | 997.860 | .113 | 2.800 | .006 |
| NDAMAGE Number of industrial crops | 2653.490 | 1273.979 | .038 | 2.083 | .040 |
| damaged |  |  |  |  |  |
| PRODYEAR Farmer's view about production | -7.441 | 3.476 | -.040 | -2.141 | .035 |
| year 1999/2000 |  |  |  |  |  |
| PRODYR3 | -11.061 | 7.849 | -.028 | -1.409 | .162 |
| HLBRYES used hired labour | -7251.995 | 2436.541 | -.057 | -2.976 | .004 |
| QKEYVTE | 18.880 | .560 | .859 | 33.731 | .000 |
| QKEYVCF | 41.265 | 1.586 | .578 | 26.018 | .000 |
| QKEYVPY | 93.140 | 22.759 | .078 | 4.092 | .000 |
| QKEYVSG | 1.579 | .038 | .831 | 41.556 | .000 |
| COFFEE | -17237.243 | 3270.494 | -.132 | -5.271 | .000 |

a Dependent Variable: VSOLDIND

Industrial Crops,, Conditional Models

## Per Capita Income Quintile 5

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.981(\mathrm{a})$ | .963 | .961 | 30061.53884 |  |

a Predictors: (Constant), QKEYVSG, HLBRYES3, QKEYVCF, NDAMAGE Number of industrial crops damaged, QKEYVTE, NSOLD Number of industrial crops sold

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -15819.849 | 7789.344 |  | -2.031 | .045 |
| NSOLD Number of industrial crops sold | 22806.729 | 4643.151 | .117 | 4.912 | .000 |
| HLBRYES3 | -44418.011 | 11880.338 | -.078 | -3.739 | .000 |
| NDAMAGE Number of industrial crops | -9221.613 | 3462.540 | -.058 | -2.663 | .009 |
| damaged |  |  |  |  |  |
| QKEYVTE | 18.350 | .400 | .941 | 45.830 | .000 |
| QKEYVCF | 20.917 | 1.256 | .336 | 16.648 | .000 |
| QKEYVSG | 1.565 | .051 | .593 | 30.412 | .000 |

a Dependent Variable: VSOLDIND

## F. Livestock, Conditional Models

## Per Capita Income Quintile 1

## Model Summary

| $R$ | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.752(\mathrm{a})$ | .566 | .538 | 10752.97770 |  |

a Predictors: (Constant), INT_LCOW, NCBULL, FEMHEAD female headed hh, PVASST02 Unstandardized Predicted Value, NSOLD_LV, SCHHEAD2, SOLDEGG, SOLDCBUL, NCCOW, NLCOW, INT_CHIC, NADULT2, NSOLD_LP, INT_CCOW

Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | 2536.948 | 1285.551 |  | 1.973 | .050 |
| NADULT2 | 369.362 | 311.439 | .071 | 1.186 | .237 |
| SCHHEAD2 | -732.158 | 289.997 | -.141 | -2.525 | .012 |
| PVASST02 Unstandardized Predicted Value | .017 | .008 | .091 | 1.985 | .048 |
| FEMHEAD female headed hh | -3103.275 | 1834.782 | -.081 | -1.691 | .092 |
| NSOLD_LP | 7481.220 | 1780.279 | .310 | 4.202 | .000 |
| NSOLD_LV | 6812.023 | 1186.609 | .281 | 5.741 | .000 |
| NCBULL | -10497.346 | 2751.192 | -.202 | -3.816 | .000 |
| NLCOW | 1823.542 | 337.652 | .284 | 5.401 | .000 |
| NCCOW | 1654.251 | 919.257 | .146 | 1.800 | .073 |
| SOLDCBUL | 10788.129 | 4932.818 | .108 | 2.187 | .030 |
| SOLDEGG | -12728.094 | 3229.263 | -.300 | -3.941 | .000 |
| INT_CCOW | 4035.854 | 1154.473 | .307 | 3.496 | .001 |
| INT_CHIC | 860.707 | 205.981 | .245 | 4.179 | .000 |
| INT_LCOW | -1027.973 | 674.158 | -.088 | -1.525 | .129 |

a Dependent Variable: VNET_LV Net value livestock income

## Livestock, Conditional Models

## Per Capita Income Quintile 2

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | :---: | :---: |
| $.711(\mathrm{a})$ | .506 | .484 | 23923.76314 |  |

a Predictors: (Constant), INT_CHIC, NSOLD_LV, INT_GCOW, ORDCOMP order interacted with ecompare, NPROD_LP, INT_CCOW, SOLDMK, SCCOW3, NGCALF, NSOLD_LP

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (Constant) | -6952.250 | 5286.945 |  | -1.315 | . 190 |
| ORDCOMP order interacted with ecompare | 874.219 | 364.354 | . 119 | 2.399 | . 017 |
| NPROD_LP | 4965.036 | 3032.608 | . 090 | 1.637 | . 103 |
| NSOLD_LP | -4785.752 | 4017.785 | -. 102 | -1.191 | . 235 |
| NSOLD_LV | 5008.167 | 1980.080 | . 137 | 2.529 | . 012 |
| NGCALF | 10976.187 | 3875.738 | . 205 | 2.832 | . 005 |
| SCCOW3 | 32525.657 | 7168.606 | . 267 | 4.537 | . 000 |
| SOLDMK | 10326.907 | 5162.643 | . 155 | 2.000 | . 047 |
| INT_GCOW | 5661.144 | 2457.878 | . 169 | 2.303 | . 022 |
| INT_CCOW | 4803.523 | 1266.784 | . 227 | 3.792 | . 000 |
| INT_CHIC | 799.611 | 277.171 | . 162 | 2.885 | . 004 |

a Dependent Variable: VNET_LV Net value livestock income

## Livestock, Conditional Models

## Per Capita Income Quintile 3

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.688(\mathrm{a})$ | .473 | .439 | 23765.04312 |  |

a Predictors: (Constant), INT_GCOW,NCBULL, NSOLD_LV,SCCOW1,NLCALF,NGBULL, ORDCOMP2,NPROD_LP, SOLDCBUL, SCCOW3, INT_CCOW, NPRODLP3, NGCALF, NGCOW

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -991.746 | 4642.764 |  | -.214 | .831 |
| ORDCOMP2 | -778.958 | 450.218 | -.092 | -1.730 | .085 |
| NPROD_LP | 6778.670 | 2591.269 | .141 | 2.616 | .010 |
| NPRODLP3 | -7177.495 | 2403.670 | -.199 | -2.986 | .003 |
| NSOLD_LV | 3850.780 | 2051.914 | .112 | 1.877 | .062 |
| SOLDCBUL | 33705.204 | 13381.824 | .138 | 2.519 | .012 |
| NGCALF | 30538.982 | 4604.005 | .467 | 6.633 | .000 |
| NLCALF | 5267.392 | 947.816 | .294 | 5.557 | .000 |
| NGBULL | 45425.669 | 12799.888 | .186 | 3.549 | .000 |
| NCBULL | 6402.490 | 2721.498 | .135 | 2.353 | .020 |
| NGCOW | -10223.280 | 7166.297 | -.373 | -1.427 | .155 |
| SCCOW3 | 28596.216 | 8335.255 | .206 | 3.431 | .001 |
| SCCOW1 | 25424.114 | 14066.845 | .090 | 1.807 | .072 |
| INT_CCOW | 3657.230 | 1440.444 | .160 | 2.539 | .012 |
| INT_GCOW | 10563.705 | 7229.230 | .382 | 1.461 | .145 |

[^24]
## Livestock, Conditional Models

## Per Capita Income Quintile 4

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.684(\mathrm{a})$ | .468 | .436 | 31279.17231 |  |

a Predictors: (Constant), INT_GCOW, SCBUL2,SGCOW2,INT_CHIC, NLCALF,NSOLD_LV,SCH_HEAD years of schooling for hh head, NCCALF, NADULT \# of adults in hh, SCHHEAD2, NSHEEP, SOLDEGG, NGCALF

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (Constant) | -4446.887 | 6375.741 |  | -. 697 | . 486 |
| NADULT \# of adults in hh | 1684.730 | 810.115 | . 110 | 2.080 | . 039 |
| SCH_HEAD years of schooling for hh head | 1200.354 | 488.666 | . 128 | 2.456 | . 015 |
| SCHHEAD2 | -2010.631 | 698.741 | -. 156 | -2.878 | . 004 |
| NGCALF | 13543.950 | 4131.466 | . 252 | 3.278 | . 001 |
| NCCALF | 8031.713 | 1772.908 | . 247 | 4.530 | . 000 |
| NLCALF | 3393.334 | 1087.780 | . 180 | 3.120 | . 002 |
| NSHEEP | -1172.572 | 482.072 | -. 142 | -2.432 | . 016 |
| NSOLD_LV | 5560.323 | 2109.877 | . 139 | 2.635 | . 009 |
| SGCOW2 | 117690.005 | 32338.110 | . 184 | 3.639 | . 000 |
| SCBUL2 | 73594.305 | 32829.109 | . 115 | 2.242 | . 026 |
| SOLDEGG | -12312.502 | 7156.791 | -. 120 | -1.720 | . 087 |
| INT_CHIC | 1598.172 | 327.237 | . 341 | 4.884 | . 000 |
| INT_GCOW | 8828.408 | 2641.618 | . 251 | 3.342 | . 001 |

a Dependent Variable: VNET_LV Net value livestock income

## Livestock, Conditional Models

## Per Capita Income Quintile 5

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :--- |
| $.917(\mathrm{a})$ | .841 | .831 | 43653.41115 |  |

a Predictors: (Constant), INT_CCOW, NCHICK, FEMHEAD female headed hh, NLCALF, SGBUL3, NSOLD_LV, SCHHEAD3, INT_GCOW, NSHEEP, NCCALF, SGCOW3, ORDCOMP3, SOLDMK3, NPRODLP3

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -6687.529 | 4959.748 |  | -1.348 | .179 |
| ORDCOMP3 | 3268.896 | 975.706 | .195 | 3.350 | .001 |
| SCHHEAD3 | -3456.407 | 913.436 | -.161 | -3.784 | .000 |
| FEMHEAD female headed hh | 15997.283 | 9515.445 | .047 | 1.681 | .094 |
| NPRODLP3 | -18574.029 | 7716.602 | -.179 | -2.407 | .017 |
| NCHICK | 751.004 | 31.666 | .679 | 23.716 | .000 |
| NCCALF | 6326.159 | 1240.151 | .192 | 5.101 | .000 |
| NSHEEP | -1652.254 | 674.187 | -.081 | -2.451 | .015 |
| NLCALF | 6221.551 | 2317.906 | .080 | 2.684 | .008 |
| NSOLD_LV | 16181.244 | 2892.993 | .171 | 5.593 | .000 |
| SGCOW3 | 44778.080 | 16150.054 | .115 | 2.773 | .006 |
| SGBUL3 | 64367.651 | 25077.813 | .088 | 2.567 | .011 |
| SOLDMK3 | 24627.688 | 14193.132 | .106 | 1.735 | .084 |
| INT_GCOW | 16923.498 | 1920.047 | .312 | 8.814 | .000 |
| INT_CCOW | 4010.643 | 1640.543 | .099 | 2.445 | .015 |

a Dependent Variable: VNET_LV Net value livestock income

## G. Informal Off-Farm, Conditional Models

## Per Capita Income Quintile 1

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.707(\mathrm{a})$ | .500 | .448 | 15323.68940 |  |

a Predictors: (Constant), MTHCARP, MINE mining business, MTHTOUT, MTHCLOTH, MTHBIKE, MTHBREW, PVASST02 Unstandardized Predicted Value, ORDCOMP2, NMTHS \# of months hh had income from informal activities, NPEOPLE3, NADULT1, NPEOPLE2, PVASSET2, TOUT Tout, CLOTHES clothes business

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (Constant) | -11885.108 | 4217.677 |  | -2.818 | . 006 |
| NMTHS \# of months hh had income from informal activities | 1447.401 | 363.355 | . 255 | 3.983 | . 000 |
| NPEOPLE2 | 9090.627 | 3522.396 | . 275 | 2.581 | . 011 |
| NPEOPLE3 | 9585.545 | 1933.357 | . 341 | 4.958 | . 000 |
| NADULT1 | 2416.567 | 525.250 | . 336 | 4.601 | . 000 |
| PVASST02 Unstandardized Predicted Value | . 056 | . 034 | . 122 | 1.643 | . 103 |
| PVASSET2 | . 118 | . 063 | . 202 | 1.863 | . 064 |
| ORDCOMP2 | -1384.592 | 609.577 | -. 286 | -2.271 | . 025 |
| MINE mining business | 26462.786 | 11085.274 | . 143 | 2.387 | . 018 |
| TOUT Tout | -167767.462 | 68326.659 | -1.270 | -2.455 | . 015 |
| CLOTHES clothes business | 217584.409 | 71449.188 | 1.647 | 3.045 | . 003 |
| MTHCLOTH | -18625.641 | 6492.618 | -1.561 | -2.869 | . 005 |
| MTHBREW | 759.550 | 433.977 | . 111 | 1.750 | . 082 |
| MTHTOUT | 17823.662 | 6015.718 | 1.528 | 2.963 | . 004 |
| MTHBIKE | 823.697 | 636.063 | . 079 | 1.295 | . 197 |
| MTHCARP | 1193.821 | 638.875 | . 115 | 1.869 | . 064 |

a Dependent Variable: VINFORM earnings from all informal off-farm activities

Informal Off-Farm, Conditional Models

## Per Capita Income Quintile 2

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.535(\mathrm{a})$ | .286 | .249 | 37420.23227 |  |

a Predictors: (Constant), MANDAS mandasi cakes, MTHHAWK, POSHO posho mill, ORDCOMP3, NMTHS \# of months hh had income from informal activities, NADULT \# of adults in hh, MTHTRANS, MTHMAND

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (Constant) | -11520.243 | 10935.552 |  | -1.053 | . 294 |
| NMTHS \# of months hh had income from informal activities | 2687.649 | 852.214 | 0.221 | 3.154 | . 002 |
| NADULT \# of adults in hh | 2263.765 | 1105.671 | . 148 | 2.047 | . 042 |
| ORDCOMP3 | 1941.445 | 1021.036 | . 132 | 1.901 | . 059 |
| MTHTRANS | 7023.604 | 3508.347 | . 153 | 2.002 | . 047 |
| MTHMAND | -184175.958 | 41846.967 | -9.568 | -4.401 | . 000 |
| MTHHAWK | -3339.258 | 2148.704 | -. 109 | -1.554 | . 122 |
| POSHO posho mill | 36418.724 | 22304.141 | . 114 | 1.633 | . 105 |
| MANDAS mandasi cakes | 2221781.518 | 494069.29 | 9.749 | 4.497 | . 000 |

a Dependent Variable: VINFORM earnings from all informal off-farm activities

Informal Off-Farm, Conditional Models

## Per Capita Income Quintile 3

## Model Summary

| $R$ | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.636(\mathrm{a})$ | .404 | .365 | 36696.46931 |  |

a Predictors: (Constant), JAGG jaggery, MTHHAWK, MTHMASON, NMTHS3, NMTHS \# of months hh had income from informal activities, SCHHEAD1, NADULT \# of adults in hh, PVASSET2, NPEOPLE1, WAGE2

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (Constant) | -21661.619 | 11089.290 |  | -1.953 | . 053 |
| NADULT \# of adults in hh | 3649.858 | 1151.224 | . 220 | 3.170 | . 002 |
| SCHHEAD1 | -3692.826 | 1129.675 | -. 259 | -3.269 | . 001 |
| PVASSET2 | . 255 | . 082 | . 300 | 3.120 | . 002 |
| NMTHS \# of months hh had income from informal activities | 2347.523 | 949.380 | . 179 | 2.473 | . 015 |
| NMTHS3 | 1196.619 | 836.728 | . 114 | 1.430 | . 155 |
| NPEOPLE1 | 16519.782 | 4089.928 | . 349 | 4.039 | . 000 |
| WAGE2 | -434.131 | 192.126 | -. 248 | -2.260 | . 025 |
| MTHHAWK | 8294.315 | 1862.991 | . 297 | 4.452 | . 000 |
| MTHMASON | 2170.847 | 1008.057 | . 145 | 2.153 | . 033 |
| JAGG jaggery | 94031.918 | 38759.530 | . 160 | 2.426 | . 016 |

a Dependent Variable: VINFORM earnings from all informal off-farm activities

Informal Off-Farm, Conditional Models

## Per Capita Income Quintile 4

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of <br> the Estimate | 1 |
| :--- | ---: | :---: | :---: | :---: |
| $.613(\mathrm{a})$ | .376 | .343 | 62766.88319 |  |

a Predictors: (Constant), MTHTIMB, MINE mining business, FEMHEAD3, SCHHEAD1, NPEOPLE \# of people earning informal income, ORDCOMP order interacted with cash income, NMTHS3, PVASSET1

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -27138.668 | 18002.063 |  | -1.508 | .134 |
| SCHHEAD1 | -2572.830 | 1631.123 | -.121 | -1.577 | .117 |
| PVASSET1 | .166 | .043 | .300 | 3.891 | .000 |
| ORDCOMP order interacted with cash income | 3251.951 | 1696.004 | .133 | 1.917 | .057 |
| NPEOPLE \# of people earning informal income | 23386.390 | 7475.486 | .203 | 3.128 | .002 |
| NMTHS3 | 5075.361 | 1062.070 | .341 | 4.779 | .000 |
| FEMHEAD3 | -82493.146 | 32982.719 | -.166 | -2.501 | .013 |
| MINE mining business | 248303.584 | 66204.167 | .252 | 3.751 | .000 |
| MTHTIMB | 9504.631 | 3798.038 | .163 | 2.503 | .013 |

a Dependent Variable: VINFORM earnings from all informal off-farm activities

Informal Off-Farm, Conditional Models

## Per Capita Income Quintile 5

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :--- |
| .701 (a) | .491 | .446 | 115820.35833 |  |

a Predictors: (Constant), CARP carpentry, PVASST02 Unstandardized Predicted Value, MTHJAGG, MTHDRIVE, MASON masonry business, FEMHEAD3, MTHRET, CLOTHES clothes business, MTHAGTRD, SCHHEAD3, MTHTIMB, ORDCOMP order interacted with cash income, PVASSET1

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -134631.380 | 28478.984 |  | -4.727 | .000 |
| ORDCOMP order interacted with cash income | 15689.930 | 2865.957 | .355 | 5.475 | .000 |
| PVASST02 Unstandardized Predicted Value | .150 | .036 | .286 | 4.217 | .000 |
| PVASSET1 | -.103 | .060 | -.113 | -1.705 | .090 |
| FEMHEAD3 | -113641.348 | 55290.589 | -.127 | -2.055 | .042 |
| SCHHEAD3 | 3751.256 | 2123.489 | .112 | 1.767 | .079 |
| MTHTIMB | 24383.343 | 4872.939 | .317 | 5.004 | .000 |
| MTHDRIVE | 10197.891 | 4417.743 | .137 | 2.308 | .022 |
| MTHJAGG | 18327.899 | 7016.766 | .157 | 2.612 | .010 |
| MTHAGTRD | 5142.097 | 2192.727 | .142 | 2.345 | .020 |
| MTHRET | 3716.705 | 1930.822 | .120 | 1.925 | .056 |
| CLOTHES clothes business | 67797.242 | 43328.296 | .095 | 1.565 | .120 |
| MASON masonry business | 87661.476 | 59618.272 | .088 | 1.470 | .144 |
| CARP carpentry | 241495.089 | 88435.082 | .172 | 2.731 | .007 |

[^25]
## H. Salaries and Remittances, Conditional Models

## Per Capita Income Quintile 1

## Model Summary

| $R$ | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.812(\mathrm{a})$ | .659 | .628 | 13100.15478 |  |

a Predictors: (Constant), MTHIND, MTHSHOP, MTHCLERK, MTHBANK, ORDCOMP order interacted with ecompare, SCH_HEAD years of schooling for hh head, WAGERATE Daily wagerate, NMTHS \# of months hh had income from sal or remit, MTHFARM, MTHPENS, NMTHS1, MTHREMIT, NPEOPLE1

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -13728.216 | 4546.908 |  | -3.019 | .003 |
| ORDCOMP order interacted with ecompare | 1257.135 | 333.895 | .199 | 3.765 | .000 |
| NMTHS \# of months hh had income from sal | 2549.558 | 337.135 | .530 | 7.562 | .000 |
| or remit |  |  |  |  |  |
| NMTHS1 | 1788.611 | 525.751 | .312 | 3.402 | .001 |
| NPEOPLE1 | -9827.144 | 3831.283 | -.288 | -2.565 | .011 |
| WAGERATE Daily wagerate | 98.252 | 47.840 | .137 | 2.054 | .042 |
| SCH_HEAD years of schooling for hh head | 879.848 | 311.647 | .150 | 2.823 | .005 |
| MTHREMIT | -2269.127 | 301.423 | -.523 | -7.528 | .000 |
| MTHCLERK | 5022.872 | 1037.656 | .270 | 4.841 | .000 |
| MTHSHOP | 7689.606 | 1385.334 | .345 | 5.551 | .000 |
| MTHFARM | -1593.424 | 513.020 | -.174 | -3.106 | .002 |
| MTHPENS | -973.811 | 628.458 | -.087 | -1.550 | .123 |
| MTHBANK | 1553.722 | 680.036 | .120 | 2.285 | .024 |
| MTHIND | 1112.257 | 510.108 | .120 | 2.180 | .031 |

a Dependent Variable: VSALREM earnings from all salary and remittance

Salaries and Remittances, Conditional Models

## Per Capita Income Quintile 2

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.693(\mathrm{a})$ | .481 | .448 | 26605.22460 |  |

a Predictors: (Constant), MTHCIVIL, MTHPOL, MTHCLERK, MTHIND, MTHTEACH, NPEOPLE \# of people earning sal or remit, NMTHS \# of months hh had income from sal or remit, ORDCOMP order interacted with ecompare, MTHREMIT

## Coefficients(a)

|  | 保 | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -33979.180 | 8957.251 |  | -3.793 | .000 |
| ORDCOMP order interacted with ecompare | 2990.226 | 644.458 | .306 | 4.640 | .000 |
| NPEOPLE \# of people earning sal or remit | 10337.267 | 4185.500 | .161 | 2.470 | .015 |
| NMTHS \# of months hh had income from sal | 2182.949 | 656.738 | .232 | 3.324 | .001 |
| or remit |  |  |  |  |  |
| MTHREMIT | -1025.926 | 475.840 | -.159 | -2.156 | .033 |
| MTHPOL | 4237.538 | 1213.430 | .226 | 3.492 | .001 |
| MTHTEACH | 2172.809 | 686.436 | .202 | 3.165 | .002 |
| MTHCLERK | 2231.012 | 890.693 | .158 | 2.505 | .013 |
| MTHIND | 1890.490 | 835.276 | .149 | 2.263 | .025 |
| MTHCIVIL | 4845.734 | 2252.690 | .130 | 2.151 | .033 |

a Dependent Variable: VSALREM earnings from all salary and remittance

Salaries and Remittances, Conditional Models

## Per Capita Income Quintile 3

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.815(\mathrm{a})$ | .664 | .620 | 33493.96355 |  |

Predictors: (Constant), MTHPOL, ORDCOMP order interacted with ecompare, MTHCLERK, NPEOPLE3, NMTHS \# of months hh had income from sal or remit, MTHDRIVE, MTHLEC, PVASST02 Unstandardized Predicted Value, MTHIND, NPEOPLE2, MTHREMIT, FEMHEAD3, MTHTEACH, SCHHEAD2, SCHHEAD3, ZONE2, ORDCOMP3, ZONE3

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -61769.281 | 13705.392 |  | -4.507 | .000 |
| ORDCOMP order interacted with ecompare | 4922.440 | 949.658 | .335 | 5.183 | .000 |
| ORDCOMP3 | -2714.116 | 1821.310 | -.234 | -1.490 | .138 |
| PVASST02 Unstandardized Predicted Value | .031 | .015 | .107 | 2.032 | .044 |
| FEMHEAD3 | 60587.645 | 18365.337 | .197 | 3.299 | .001 |
| SCHHEAD2 | 2866.092 | 1446.366 | .182 | 1.982 | .050 |
| SCHHEAD3 | 6977.398 | 1577.497 | .514 | 4.423 | .000 |
| NPEOPLE2 | 44316.014 | 8848.375 | .504 | 5.008 | .000 |
| NPEOPLE3 | 46453.242 | 13825.631 | .459 | 3.360 | .001 |
| NMTHS \# of months hh had income from sal or | 4757.672 | 953.254 | .285 | 4.991 | .000 |
| remit |  |  |  |  |  |
| MTHDRIVE | 4630.999 | 969.349 | .258 | 4.777 | .000 |
| MTHTEACH | 2457.868 | 783.567 | .182 | 3.137 | .002 |
| ZONE2 | -72614.390 | 16040.725 | -.548 | -4.527 | .000 |
| ZONE3 | -87033.955 | 26730.287 | -.677 | -3.256 | .001 |
| MTHIND | 2512.816 | 1060.242 | .130 | 2.370 | .019 |
| MTHCLERK | 2183.492 | 1190.509 | .103 | 1.834 | .069 |
| MTHLEC | -6593.321 | 2927.426 | -.117 | -2.252 | .026 |
| MTHREMIT | -1100.093 | 583.739 | -.112 | -1.885 | .062 |
| MTHPOL | 4290.148 | 2822.368 | .076 | 1.520 | .131 |

a Dependent Variable: VSALREM earnings from all salary and remittance

Salaries and Remittances, Conditional Models

## Per Capita Income Quintile 4

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | :---: |
| $.698(\mathrm{a})$ | .487 | .452 | 51115.01480 |  |

a Predictors: (Constant), MTHTEACH, SCHHEADI, MTHSALES, NPEOPLE \# of people earning sal or remit, MTHFARM, NMTHS \# of months hh had income from sal or remit, ORDCOMP order interacted with ecompare, MTHREMIT, SCH_HEAD years of schooling for hh head, ZONE1

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :--- | :--- | ---: | ---: | ---: | ---: |
| (Constant) | -80635.725 | 17886.578 |  | -4.508 | .000 |
| ORDCOMP order interacted with ecompare | 2983.035 | 1047.050 | .189 | 2.849 | .005 |
| SCH_HEAD years of schooling for hh head | 1779.469 | 1176.256 | .118 | 1.513 | .133 |
| SCHHEAD1 | 5976.984 | 2616.988 | .317 | 2.284 | .024 |
| ZONE1 | -40307.939 | 23826.004 | -.222 | -1.692 | .093 |
| NPEOPLE \# of people earning sal or remit | 40497.952 | 7555.627 | .350 | 5.360 | .000 |
| NMTHS \# of months hh had income from sal | 4816.867 | 1470.320 | .226 | 3.276 | .001 |
| or remit |  |  |  |  |  |
| MTHREMIT | -2474.435 | 934.888 | -.183 | -2.647 | .009 |
| MTHFARM | -5438.789 | 2050.378 | -.168 | -2.653 | .009 |
| MTHSALES | 3347.529 | 1843.482 | .113 | 1.816 | .071 |
| MTHTEACH | 2055.285 | 985.437 | .143 | 2.086 | .039 |

a Dependent Variable: VSALREM earnings from all salary and remittance

Salaries and Remittances, Conditional Models

## Per Capita Income Quintile 5

## Model Summary

| R | R Square | Adjusted <br> R Square | Std. Error of the <br> Estimate | 1 |
| :--- | ---: | ---: | ---: | ---: |
| $.840(\mathrm{a})$ | .706 | .677 | 62009.49880 |  |

a Predictors: (Constant), ZONE2, NMTHS \# of months hh had income from sal or remit, MTHMGR, MTHLEC, MTHBANK, MTHPOL, MTHPENS, MTHREMIT, NPEOPLE1, PVASST02 Unstandardized Predicted Value, NPEOPLE \# of people earning sal or remit, SCH_HEAD years of schooling for hh head, ORDCOMP1, NPEOPLE2

## Coefficients(a)

|  | B | Std. Error | Beta | t | sig |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (Constant) | -138463.686 | 23560.279 |  | -5.877 | . 000 |
| ORDCOMP1 | 6101.218 | 2397.505 | . 297 | 2.545 | . 012 |
| PVASST02 Unstandardized Predicted Value | . 033 | . 019 | . 092 | 1.727 | . 086 |
| NPEOPLE \# of people earning sal or remit | 87405.544 | 7689.324 | . 647 | 11.367 | . 000 |
| NPEOPLE1 | -56402.568 | 18483.930 | -. 362 | -3.051 | . 003 |
| NPEOPLE2 | -79117.668 | 19562.942 | -. 480 | -4.044 | . 000 |
| SCH_HEAD years of schooling for hh head | 4336.894 | 1286.250 | . 193 | 3.372 | . 001 |
| NMTHS \# of months hh had income from sal or remit | 6604.217 | 1904.267 | . 169 | 3.468 | . 001 |
| MTHMGR | 11107.376 | 2148.505 | . 255 | 5.170 | . 000 |
| MTHLEC | 10286.180 | 2804.355 | . 180 | 3.668 | . 000 |
| MTHBANK | 6468.358 | 2078.183 | . 148 | 3.113 | . 002 |
| MTHREMIT | -3288.065 | 1093.811 | -. 172 | -3.006 | . 003 |
| MTHPENS | -4116.847 | 1520.631 | -. 130 | -2.707 | . 008 |
| MTHPOL | 9021.798 | 4522.343 | . 112 | 1.995 | . 048 |
| ZONE2 | 83747.872 | 36380.611 | . 247 | 2.302 | . 023 |

a Dependent Variable: VSALREM earnings from all salary and remittance

## Annex E:

## Procedures for Generating Income and Income Component Estimates Using Spss/windows Syntax File

To generate estimates of income and income components using SPSS/Windows, first clean the data. After cleaning, all conversion of questionnaire variables to proxy variables, and use of those variables to compute estimated incomes and income components, will be done by an SPSS syntax file developed by Tegemeo/MSU. The steps for using the SPSS for Windows package are as follows:

1. Enter the questionnaire data in the following files (note that "??" in each file name refers to the two-digit year in which the survey was conducted; for surveys done in 2002, "??" should be replaced with "02"):

| $\begin{gathered} \text { File } \\ \# \end{gathered}$ | File Name | Relation to Questionnaire | Variables |
| :---: | :---: | :---: | :---: |
| 1 | HHIDFINAL??.SAV | First page - ID variables | key variables ENUM, REPLACE |
| 2 | HH??.SAV | Household level file - all questions not in tables | key variables <br> TACRE1 ... WAGE |
| 3 | DEMOG??.SAV | Member level file - all data from Household Member tables | key variables <br> MEM <br> NAME <br> D01 ... D111 |
| 4 | CROP??.SAV | Crop level file -- all data from "Cereals, Tubers, Pulses", "Fruits \& Vegetables", "Industrial Crops" tables | key variables <br> CROP <br> PROD ... SELL |
| 5 | LIVESTK??.SAV | Animal level file -- Livestock table | key variables <br> ANIMAL <br> NAMIM, SELLANIM |
| 6 | LIVEPROD??.SAV | Animal products level file -Livestock products table | key variables <br> ANIMPROD <br> NPROD, SELLPROD |
| 7 | OFFARM??.SAV | Month level file - all data from "Participation in offfarm activities over the past 12 months" table | key variables <br> MONTH <br> INFMTH, SALMTH |


| File <br> $\#$ | File Name | Relation to Questionnaire | Variables |
| :--- | :--- | :--- | :--- |
| 8 | BUSLAB??.SAV | Activity level file - data from <br> left hand portion of "Business <br> and <br> informal off-farm <br> activities, and salaried wage <br> labour" table | key variables <br> ACTINF <br> INFORMAL |
| 9 | SALWAGE??.SAV | Activity level file - data from <br> right hand portion of <br> "Business and informal off- <br> farm activities, and salaried <br> wage labour" table | key variables <br> ACTSAL <br> SALARIED |
| 10 | ASSET??.SAV | All data from assets table | key variables <br> ITEM <br> QTY |
| 12 | ECACT??.SAV | All data from "Importance of <br> Income Sources" Table | key variables <br> ECONACT <br> ORDER |

2. Save these uncleaned files in a folder of your choice. This will be your copy of the original, uncleaned data, which should not be changed.
3. Create the folder c:\proxy??\incprox\data and copy all 12 uncleaned files to it. As in the file naming conventions in the table above, replace "??" with the two digit year of the survey, e.g., "02" if the survey was conducted in 2002.
4. Clean the files in c:\proxy???incproxldata using procedures your institution has developed with other surveys, and save the files to the same names. You will now have uncleaned, original data in a folder of your choice, and cleaned data in c:\proxy??\incprox\data.
5. Create the folder c:\proxy??\incprox\syntax and copy the file IncproxEstimateKenya.sps to it. Tegemeo/MSU will provide you with a copy of this file upon request.

6 Run IncproxEstimateKenya.sps. This file will create all required proxy variables and generate income results, saving them to the file IncomeKenya.sav. It will also deliver mean and median values for household income and income components in the SPSS Output Navigator.


[^0]:    ${ }^{1}$ See, for example, Daniels 1999; Glewwe 1990; Glewwe and Kanaan 1989; Grosh and Baker 1995; Hentschel et al. 1998; Jalan and Ravallion 1999; Little 1997; Minot 2000; Morris et al. 1999; Ravallion and Lokshin 1999; Riely et al 1999; Rose 2000; Rose and Tschirley 2000; Sahn and Stifel 2000a; Sahn and Stifel 2000b; Swindale and Ohri-Vachaspati 1999; Takasaki and Barham 20001; Wolfe and Frongillo 2000; World Bank 2001;

[^1]:    ${ }^{2}$ If desired, the models could be developed to return per capita household income, as opposed to total household income.

[^2]:    ${ }^{3}$ For a good introduction to this topic, see Ravallion, Martin (1999). "The Mystery of the Vanishing Benefits: Ms. Speedy Analyst's Introduction to Evaluation". Policy Research Working Paper ..., Washington, D.C., World Bank.. This can be downloaded from the web by going to www.worldbank.org/research/, choosing "poverty", then searching for "Ravallion" under "Policy Research Working Papers".

[^3]:    4 Though initial results for the proxy method are produced instantaneously by running the syntax file already created, results have to be reviewed for consistency and checked for outliers. This process took one week at about $50 \%$ time for a Senior Analyst on the NGO survey of 1,200 households.

[^4]:    ${ }^{5}$ See Argwings-Kodhek et al (1999), "How Can Micro-level Household Information Make a Difference for Agricultural Policy Making? Selected Examples from the KAMPAP Survey of Smallholder Agriculture and Non-Farm Activities for Selected Districts in Kenya," for more background on the methods used in the Tampa Survey.

[^5]:    ${ }^{6}$ This proxy variable is generated from a regression using simple yes/no responses to the ownership of a set of 15 assets. Thus, it is not necessary to collect number owned and value of a large set of assets to obtain this variable.

[^6]:    ${ }^{7}$ Full model results can be found in Annex D.

[^7]:    ${ }^{8}$ This current analysis is an internal evaluation of the income proxy method's results, and is not meant to compare these results to those from the Ministry of Planning and Finance (2000a and 2000b). See later in the report for a brief comparison of the two data sets.

[^8]:    
    
     you may contact the Director, Tegemeo Institute, Egerton University P. 0 Box 20498, 00200. Nairobi"

[^9]:    a Dependent Variable: VSOLDNET

[^10]:    a Dependent Variable: VRETNET

[^11]:    a Dependent Variable: VRETNET

[^12]:    a Dependent Variable: VSOLDNET

[^13]:    a Dependent Variable: VINFORM earnings from all informal off-farm activities

[^14]:    a Dependent Variable: VSALREM earnings from all salary and remittance

[^15]:    a Dependent Variable: VSALREM earnings from all salary and remittance

[^16]:    a Dependent Variable: VSALREM earnings from all salary and remittance

[^17]:    a Dependent Variable: VRETCTP

[^18]:    a Dependent Variable: VRETCTP

[^19]:    a Dependent Variable: VRETFV

[^20]:    a Dependent Variable: VRETFV

[^21]:    Dependent Variable: VRETFV

[^22]:    Dependent Variable: VRETFV

[^23]:    a Dependent Variable: VSOLDFV

[^24]:    a Dependent Variable: VNET_LV Net value livestock income

[^25]:    a Dependent Variable: VINFORM earnings from all informal off-farm activities

