

## **Supplementary Materials**

**Food Consumption–Production Adjustments to Economic Crises**

**Under Credit Constraints in Nigeria**

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## **Interpretation of the estimation coefficients on calorie intake per capita**

Tables SC1–C3 report the FE estimation results of the relationship between food production diversity and household income and total calorie intake per capita. The estimated coefficients are robust to any choice of the two classifications, and any specification of the models. As suspected, the calorie intake per capita is significantly related to food production diversity. Specifically, the estimate in the loan classification show that adding one crop to the portfolio of farm crops increased average per capita calorie intake by roughly ( $e^{0.06}$ ) or 6.18% (column i, Table SC1). This estimate mirrors the statistically significant relationship between Simpson production diversity index (SPDI) and total calorie consumption per capita found by Ecker and Hatzenbuehler (2021). The percentage point increase in calorie intake per capita slightly reduced to 4.60% in the mixed classification. These results imply that households that diversified their food production consumed similar diets irrespective of having binding credit constraints or not. The results again imply that households diversified diets as observed on FVS and DDS with the aim of achieving balanced diets. This estimated effect remained unchanged after investigated it by the CF (see Table SD3). However, results from the mixture of loan-and-asset classification slightly reduced in magnitude [columns (iv)–(v), Table SD3].

Moreover, the estimated coefficient for the per capita income is positive and significant. This suggests that an increase in income of each household-member generates significant increase in the per capita calorie consumption. Table SC2 shows that the point estimate of the elasticity for the estimation that controls for farm characteristics equals 0.311 (column ii). This implies that a 10% increase in income increases per capita calorie consumption of the credit-unconstrained households by, on average, roughly 31.1%. However, the percentage point change increases average calorie consumption per capita of the credit-constrained households by roughly 41.6% (column iii). The elasticity for the estimation that neglects the presence of credit constraints is roughly 36% (column i), which lies in the middle of the previous elasticities as was observed on dietary diversity indicators. This time, however, estimate for the credit-constrained households is closer in magnitude to the point estimate reported by Ecker and Hatzenbuehler (2021), unlike

in the case of dietary diversity indicators. This suggests that stratifying households according to their credit situations is important for improved precision of results for any choice of the household groups selected for investigation. Results from investigation that neglects credit constraints and run a pooled panel dataset appear to be relatively less precise than if households were differentiated by their credit conditions. However, this does not contradict the soundness of findings in the existing studies because there is severe measurement errors in the calorie consumption indicator (NBS and World Bank, 2016a, 2016b), which might have seriously affected the estimated coefficients on the per capita calorie consumption.

As Table SD3 shows, after controlling for the correlated effects due to the credit constraints, the income elasticities became 0.44 for the credit-unconstrained households and 0.62 ( $=0.437+0.186$ ) for the credit-constrained households (column ii). Similar to results on dietary diversity's indicators, credit-constrained households appear to be hand-to-mouth given the elasticity of calorie consumption with respect to income. Table SD3 specifically reports that credit-constrained households were consuming about 18.6% more calorie per capita than their counterpart unconstrained households for every 10% increased per capita income earned (see credit : expenditure, column ii). While credit-constrained households remained impatient, credit-unconstrained households were smoothing consumption as previously observed on FVS and DDS.

As Ecker and Hatzenbuehler (2021) noted, results on calorie consumption should be used with caution. This is because food consumption quantities in the GHS-Panel, from where the per capita calorie consumption indicator was constructed, have serious measurement errors. The errors of measurement were correlated with the inconsistencies in the documentation of food quantities that were reported in nonstandard units such as bowl, heap, piece, and bunch (NBS, 2018).

**TABLE SA.1** Estimation results of the household fixed effects model for the dietary diversity indicator

a

| Model specifications                          | Food variety score (FVS)         |          |          |                                 |          |          |
|---|----------------------------------|----------|----------|---------------------------------|----------|----------|
|   | Classification on basis of loans |          |          | Loan and assets' classification |          |          |
|   | (i)                              | (ii)     | (iii)    | (iv)                            | (v)      | (vi)     |
| <i>Income &amp; crop production diversity</i> |                                  |          |          |                                 |          |          |
| Food crop variety                             | 0.212***                         | 0.227*** | 0.214*** | 0.170***                        | 0.168*** | 0.183*** |
|   | (0.045)                          | (0.063)  | (0.066)  | (0.038)                         | (0.053)  | (0.053)  |
| Expenditure per capita (log)                  | 2.576***                         | 2.176*** | 3.100*** | 2.598***                        | 2.287*** | 2.950*** |
|   | (0.119)                          | (0.152)  | (0.189)  | (0.099)                         | (0.133)  | (0.146)  |
| <i>Household demographics</i>                 |                                  |          |          |                                 |          |          |
| Age of the household head                     | -0.004                           | -0.008   | -0.004   | -0.003*                         | -0.005   | -0.003   |
|   | (0.003)                          | (0.012)  | (0.003)  | (0.002)                         | (0.010)  | (0.002)  |
| Household head's education                    | -0.002                           | 0.012    | -0.017   | -0.023                          | -0.024   | -0.021   |
|   | (0.018)                          | (0.024)  | (0.028)  | (0.015)                         | (0.021)  | (0.022)  |
| Sex of the household head                     |                                  |          |          | 5.975                           |          | 6.076    |
|   |                                  |          |          | (3.898)                         |          | (3.968)  |
| Household size                                | 0.338***                         | 0.340*** | 0.355*** | 0.386***                        | 0.378*** | 0.401*** |
|   | (0.064)                          | (0.081)  | (0.104)  | (0.051)                         | (0.071)  | (0.072)  |
| Observations                                  | 4,656                            | 2,475    | 2,181    | 7,008                           | 3,597    | 3,411    |
| Adjusted R-squared                            | 0.139                            | 0.123    | 0.163    | 0.135                           | 0.116    | 0.157    |
| Overall R-squared                             | -0.294                           | -0.321   | -0.261   | -0.299                          | -0.329   | -0.268   |

<sup>a</sup> The sample has 1,552 pooled households [column (i)], 825 credit-unconstrained households [column (ii)], and 727 credit-constrained households [column (iii)] per wave in the loan classification. There are 2,336 total households [column (iv)], 1,199 credit-unconstrained households [column (v)], and 1,137 credit-constrained households [column (vi)] per wave in the loan and asset classification. Standard errors (in parentheses) are clustered at the household level. \*\*\*, \*\*, \* Coefficient is statistically significant at the 1%, 5%, and 10% level, respectively.

**TABLE SA.2** Estimation results of the household fixed effects model for the dietary diversity indicator

<sup>b</sup>

| Model specifications                          | Food variety score (FVS)         |                     |                     |                                 |                     |                     |
|---|----------------------------------|---------------------|---------------------|---------------------------------|---------------------|---------------------|
|   | Classification on basis of loans |                     |                     | Loan and assets' classification |                     |                     |
|   | (i)                              | (ii)                | (iii)               | (iv)                            | (v)                 | (vi)                |
| <i>Income &amp; crop production diversity</i> |                                  |                     |                     |                                 |                     |                     |
| Food crop variety                             | 0.188***<br>(0.046)              | 0.198***<br>(0.064) | 0.195***<br>(0.067) | 0.152***<br>(0.038)             | 0.149***<br>(0.055) | 0.165***<br>(0.054) |
| Expenditure per capita (log)                  | 2.556***<br>(0.119)              | 2.165***<br>(0.151) | 3.081***<br>(0.190) | 2.586***<br>(0.099)             | 2.279***<br>(0.133) | 2.927***<br>(0.146) |
| <i>Farm household characteristics</i>         |                                  |                     |                     |                                 |                     |                     |
| Off-farm employment                           | 0.338**<br>(0.147)               | 0.164<br>(0.195)    | 0.449**<br>(0.222)  | 0.329***<br>(0.121)             | 0.185<br>(0.168)    | 0.437**<br>(0.175)  |
| Farm size (acres)                             | 0.034*<br>(0.018)                | 0.029<br>(0.023)    | 0.040<br>(0.030)    | 0.025*<br>(0.015)               | 0.018<br>(0.020)    | 0.032<br>(0.022)    |
| Cash crop production                          | 0.266<br>(0.264)                 | 0.009<br>(0.384)    | 0.395<br>(0.366)    | 0.163<br>(0.212)                | -0.151<br>(0.311)   | 0.389<br>(0.292)    |
| Poultry ownership                             | 0.240*<br>(0.137)                | 0.567***<br>(0.177) | -0.163<br>(0.214)   | 0.186*<br>(0.113)               | 0.427***<br>(0.153) | -0.087<br>(0.167)   |
| Cattle ownership                              | 0.223<br>(0.217)                 | 0.437<br>(0.273)    | -0.144<br>(0.350)   | 0.204<br>(0.179)                | 0.310<br>(0.238)    | 0.088<br>(0.270)    |
| Sheep or goat ownership                       | 0.023                            | 0.072               | -0.066              | -0.023                          | 0.049               | -0.114              |

|                               |         |         |         |         |         |         |
|-------------------------------|---------|---------|---------|---------|---------|---------|
|                               | (0.151) | (0.195) | (0.235) | (0.125) | (0.170) | (0.183) |
| <i>Household demographics</i> |         |         |         |         |         |         |
| Age of the household head     | -0.004  | -0.006  | -0.004  | -0.003* | -0.003  | -0.003  |
|                               | (0.003) | (0.012) | (0.003) | (0.002) | (0.010) | (0.002) |

**TABLE SA.2** continued.

| Model specifications       | Food variety score (FVS)         |          |          |                                 |          |          |
|----------------------------|----------------------------------|----------|----------|---------------------------------|----------|----------|
|                            | Classification on basis of loans |          |          | Loan and assets' classification |          |          |
|                            | (i)                              | (ii)     | (iii)    | (iv)                            | (v)      | (vi)     |
| Household head's education | -0.001                           | 0.013    | -0.014   | -0.023                          | -0.023   | -0.022   |
|                            | (0.018)                          | (0.024)  | (0.028)  | (0.015)                         | (0.021)  | (0.022)  |
| Sex of the household head  |                                  |          |          | 5.801                           |          | 5.738    |
|                            |                                  |          |          | (3.897)                         |          | (3.969)  |
| Household size             | 0.320***                         | 0.310*** | 0.357*** | 0.375***                        | 0.352*** | 0.397*** |
|                            | (0.064)                          | (0.081)  | (0.104)  | (0.051)                         | (0.071)  | (0.072)  |
| Observations               | 4,656                            | 2,475    | 2,181    | 7,008                           | 3,597    | 3,411    |
| Adjusted R-squared         | 0.143                            | 0.133    | 0.168    | 0.138                           | 0.122    | 0.162    |
| Overall R-squared          | -0.290                           | -0.310   | -0.259   | -0.296                          | -0.324   | -0.265   |

<sup>b</sup> An extension of the model specification that produced estimation results in Table SA1. That is, results of using farm household variables and the demographic variables as control variables.

**TABLE SA.3** Estimation results of the household fixed effects model for the dietary diversity indicator

c

| Model specifications                          | Food variety score (FVS)         |                      |                      |                                 |                       |                      |
|---|----------------------------------|----------------------|----------------------|---------------------------------|-----------------------|----------------------|
|   | Classification on basis of loans |                      |                      | Loan and assets' classification |                       |                      |
|   | (i)                              | (ii)                 | (iii)                | (iv)                            | (v)                   | (vi)                 |
| <i>Income &amp; crop production diversity</i> |                                  |                      |                      |                                 |                       |                      |
| Food crop variety                             | 0.474 <sup>*</sup>               | 0.586                | 0.440                | 0.698 <sup>***</sup>            | 1.047 <sup>***</sup>  | 0.412                |
|   | (0.288)                          | (0.392)              | (0.428)              | (0.239)                         | (0.346)               | (0.333)              |
| Expenditure per capita (log)                  | 2.749 <sup>***</sup>             | 2.425 <sup>***</sup> | 3.249 <sup>***</sup> | 2.952 <sup>***</sup>            | 2.876 <sup>***</sup>  | 3.093 <sup>***</sup> |
|   | (0.226)                          | (0.300)              | (0.347)              | (0.186)                         | (0.263)               | (0.266)              |
| Food crops × expenditure                      | -0.057                           | -0.079               | -0.049               | -0.110 <sup>**</sup>            | -0.181 <sup>***</sup> | -0.050               |
|   | (0.057)                          | (0.079)              | (0.084)              | (0.048)                         | (0.069)               | (0.066)              |
| <i>Farm household characteristics</i>         |                                  |                      |                      |                                 |                       |                      |
| Off-farm employment                           | 0.333 <sup>**</sup>              | 0.157                | 0.445 <sup>**</sup>  | 0.323 <sup>***</sup>            | 0.176                 | 0.434 <sup>**</sup>  |
|   | (0.147)                          | (0.195)              | (0.222)              | (0.121)                         | (0.167)               | (0.176)              |
| Farm size (acres)                             | 0.033 <sup>*</sup>               | 0.029                | 0.039                | 0.024 <sup>*</sup>              | 0.018                 | 0.031                |
|   | (0.018)                          | (0.023)              | (0.030)              | (0.015)                         | (0.020)               | (0.022)              |
| Cash crop production                          | 0.283                            | 0.017                | 0.415                | 0.187                           | -0.138                | 0.405                |
|   | (0.264)                          | (0.384)              | (0.368)              | (0.213)                         | (0.311)               | (0.293)              |
| Poultry ownership                             | 0.239 <sup>*</sup>               | 0.561 <sup>***</sup> | -0.160               | 0.186 <sup>*</sup>              | 0.415 <sup>***</sup>  | -0.084               |
|   | (0.137)                          | (0.177)              | (0.214)              | (0.113)                         | (0.153)               | (0.167)              |
| Cattle ownership                              | 0.224                            | 0.433                | -0.138               | 0.207                           | 0.296                 | 0.095                |



|                         |         |         |         |         |         |         |
|-------------------------|---------|---------|---------|---------|---------|---------|
|                         | (0.217) | (0.273) | (0.351) | (0.179) | (0.238) | (0.270) |
| Sheep or goat ownership | 0.022   | 0.076   | -0.072  | -0.025  | 0.059   | -0.119  |
|                         | (0.151) | (0.195) | (0.235) | (0.125) | (0.170) | (0.183) |

**TABLE SA.3** continued.

| Model specifications          | Food variety score (FVS)         |          |          |                                 |          |          |
|-------------------------------|----------------------------------|----------|----------|---------------------------------|----------|----------|
|                               | Classification on basis of loans |          |          | Loan and assets' classification |          |          |
|                               | (i)                              | (ii)     | (iii)    | (iv)                            | (v)      | (vi)     |
| <i>Household demographics</i> |                                  |          |          |                                 |          |          |
| Age of the household head     | -0.004                           | -0.006   | -0.004   | -0.003*                         | -0.004   | -0.003   |
|                               | (0.003)                          | (0.012)  | (0.003)  | (0.002)                         | (0.010)  | (0.002)  |
| Household head's education    | -0.0004                          | 0.014    | -0.014   | -0.023                          | -0.022   | -0.022   |
|                               | (0.018)                          | (0.024)  | (0.028)  | (0.015)                         | (0.021)  | (0.022)  |
| Sex of the household head     |                                  |          |          | 5.804                           |          | 5.735    |
|                               |                                  |          |          | (3.895)                         |          | (3.969)  |
| Household size                | 0.318***                         | 0.305*** | 0.356*** | 0.372***                        | 0.343*** | 0.397*** |
|                               | (0.064)                          | (0.081)  | (0.104)  | (0.051)                         | (0.071)  | (0.072)  |
| Observations                  | 4,656                            | 2,475    | 2,181    | 7,008                           | 3,597    | 3,411    |
| Adjusted R-squared            | 0.144                            | 0.133    | 0.168    | 0.139                           | 0.124    | 0.162    |
| Overall R-squared             | -0.290                           | -0.310   | -0.260   | -0.295                          | -0.321   | -0.265   |

\* Expanding the model specification that yielded estimation results in Table SA2: Results from incorporating the interaction term between income and food production diversity.

**TABLE SB.1** Estimation results of the household fixed effects model for the dietary diversity indicator

d

| Model specifications                          | Dietary diversity score (DDS)    |                     |                     |                                 |                     |                     |
|---|----------------------------------|---------------------|---------------------|---------------------------------|---------------------|---------------------|
|   | Classification on basis of loans |                     |                     | Loan and assets' classification |                     |                     |
|   | (i)                              | (ii)                | (iii)               | (iv)                            | (v)                 | (vi)                |
| <i>Income &amp; crop production diversity</i> |                                  |                     |                     |                                 |                     |                     |
| Food crop groups                              | 0.142***<br>(0.035)              | 0.120**<br>(0.052)  | 0.166***<br>(0.048) | 0.133***<br>(0.030)             | 0.110**<br>(0.043)  | 0.159***<br>(0.042) |
| Expenditure per capita (log)                  | 1.017***<br>(0.052)              | 0.874***<br>(0.070) | 1.211***<br>(0.080) | 1.048***<br>(0.044)             | 0.898***<br>(0.060) | 1.219***<br>(0.064) |
| <i>Household demographics</i>                 |                                  |                     |                     |                                 |                     |                     |
| Age of the household head                     | -0.001<br>(0.001)                | -0.0001<br>(0.005)  | -0.001<br>(0.001)   | -0.001<br>(0.001)               | -0.001<br>(0.005)   | -0.001<br>(0.001)   |
| Household head's education                    | 0.007<br>(0.008)                 | 0.006<br>(0.011)    | 0.009<br>(0.012)    | -0.0003<br>(0.007)              | -0.002<br>(0.009)   | 0.002<br>(0.010)    |
| Sex of the household head                     |                                  |                     |                     | 3.948**<br>(1.731)              |                     | 4.026**<br>(1.752)  |
| Household size                                | 0.143***<br>(0.028)              | 0.129***<br>(0.037) | 0.168***<br>(0.044) | 0.174***<br>(0.023)             | 0.151***<br>(0.032) | 0.199***<br>(0.032) |
| Observations                                  | 4,656                            | 2,475               | 2,181               | 7,008                           | 3,597               | 3,411               |

|                    |        |        |        |        |        |        |
|--------------------|--------|--------|--------|--------|--------|--------|
| Adjusted R-squared | 0.114  | 0.093  | 0.143  | 0.116  | 0.092  | 0.144  |
| Overall R-squared  | -0.332 | -0.366 | -0.291 | -0.329 | -0.366 | -0.289 |

<sup>d</sup> Each wave has 1,552 total households [column (i)], 825 credit-unconstrained households [column (ii)], and 727 credit-constrained households [column (iii)] in the loan classification. There are 2,336 pooled households [column (i)], 1,199 households with unbinding credit constraints [column (ii)], and 1,137 households with binding credit constraints [column (iii)] per wave in the mixed classification. Standard errors (in parentheses) are clustered at the household level. \*\*\*, \*\*, \* Coefficient is statistically significant at the 1%, 5%, and 10% level, respectively.

**TABLE SB.2** Estimation results of the household fixed effects model for the dietary diversity indicator

<sup>e</sup>

| Model specifications                          | Dietary diversity score (DDS)    |                     |                     |                                 |                     |                     |
|---|----------------------------------|---------------------|---------------------|---------------------------------|---------------------|---------------------|
|   | Classification on basis of loans |                     |                     | Loan and assets' classification |                     |                     |
|   | (i)                              | (ii)                | (iii)               | (iv)                            | (v)                 | (vi)                |
| <i>Income &amp; crop production diversity</i> |                                  |                     |                     |                                 |                     |                     |
| Food crop groups                              | 0.124***<br>(0.036)              | 0.088*<br>(0.053)   | 0.157***<br>(0.050) | 0.116***<br>(0.030)             | 0.087**<br>(0.044)  | 0.148***<br>(0.042) |
| Expenditure per capita (log)                  | 1.008***<br>(0.052)              | 0.873***<br>(0.069) | 1.208***<br>(0.080) | 1.042***<br>(0.044)             | 0.897***<br>(0.060) | 1.212***<br>(0.065) |
| <i>Farm household characteristics</i>         |                                  |                     |                     |                                 |                     |                     |
| Off-farm employment                           | 0.163**<br>(0.065)               | 0.105<br>(0.089)    | 0.190**<br>(0.094)  | 0.136**<br>(0.054)              | 0.105<br>(0.075)    | 0.150*<br>(0.078)   |
| Farm size (acres)                             | 0.015*<br>(0.008)                | 0.014<br>(0.011)    | 0.019<br>(0.013)    | 0.014**<br>(0.007)              | 0.011<br>(0.009)    | 0.016<br>(0.010)    |
| Cash crop production                          | 0.146<br>(0.117)                 | 0.293*<br>(0.177)   | 0.012<br>(0.156)    | 0.148<br>(0.095)                | 0.166<br>(0.139)    | 0.110<br>(0.130)    |
| Poultry ownership                             | 0.085<br>(0.061)                 | 0.213***<br>(0.081) | -0.078<br>(0.091)   | 0.058<br>(0.050)                | 0.141**<br>(0.068)  | -0.038<br>(0.074)   |

|                               |                    |                     |                   |                   |                    |                   |
|-------------------------------|--------------------|---------------------|-------------------|-------------------|--------------------|-------------------|
| Cattle ownership              | 0.205**<br>(0.096) | 0.342***<br>(0.125) | -0.014<br>(0.148) | 0.110<br>(0.079)  | 0.176*<br>(0.106)  | 0.037<br>(0.119)  |
| Sheep or goat ownership       | -0.059<br>(0.066)  | -0.015<br>(0.089)   | -0.113<br>(0.099) | -0.015<br>(0.055) | 0.032<br>(0.076)   | -0.066<br>(0.081) |
| <i>Household demographics</i> |                    |                     |                   |                   |                    |                   |
| Age of the household head     | -0.001<br>(0.001)  | 0.0003<br>(0.005)   | -0.001<br>(0.001) | -0.001<br>(0.001) | -0.0001<br>(0.005) | -0.001<br>(0.001) |

**TABLE SB.2** continued.

| Model specifications       | Dietary diversity score (FVS)    |                     |                     |                                 |                     |                     |
|----------------------------|----------------------------------|---------------------|---------------------|---------------------------------|---------------------|---------------------|
|                            | Classification on basis of loans |                     |                     | Loan and assets' classification |                     |                     |
|                            | (i)                              | (ii)                | (iii)               | (iv)                            | (v)                 | (vi)                |
| Household head's education | 0.007<br>(0.008)                 | 0.006<br>(0.011)    | 0.009<br>(0.012)    | -0.0004<br>(0.007)              | -0.001<br>(0.009)   | 0.002<br>(0.010)    |
| Sex of the household head  |                                  |                     |                     | 3.874**<br>(1.730)              |                     | 3.886**<br>(1.754)  |
| Household size             | 0.136***<br>(0.028)              | 0.118***<br>(0.037) | 0.171***<br>(0.044) | 0.169***<br>(0.023)             | 0.142***<br>(0.032) | 0.197***<br>(0.032) |
| Observations               | 4,656                            | 2,475               | 2,181               | 7,008                           | 3,597               | 3,411               |
| Adjusted R-squared         | 0.120                            | 0.106               | 0.149               | 0.119                           | 0.097               | 0.147               |
| Overall R-squared          | -0.326                           | -0.351              | -0.288              | -0.325                          | -0.361              | -0.287              |

<sup>e</sup> An extension of the model specification that produced estimation results in Table SB1. That is, results from estimation that controls for farm household characteristics and the households demographics.

**TABLE SB.3** Estimation results of the household fixed effects model for the dietary diversity indicator

f

| Model specifications                          | Dietary diversity score (DDS)    |                     |                     |                                 |                     |                     |
|---|----------------------------------|---------------------|---------------------|---------------------------------|---------------------|---------------------|
|   | Classification on basis of loans |                     |                     | Loan and assets' classification |                     |                     |
|   | (i)                              | (ii)                | (iii)               | (iv)                            | (v)                 | (vi)                |
| <i>Income &amp; crop production diversity</i> |                                  |                     |                     |                                 |                     |                     |
| Food crop groups                              | 0.587***<br>(0.217)              | 0.478<br>(0.314)    | 0.798***<br>(0.305) | 0.663***<br>(0.183)             | 0.565**<br>(0.268)  | 0.780***<br>(0.252) |
| Expenditure per capita (log)                  | 1.214***<br>(0.109)              | 1.042***<br>(0.151) | 1.505***<br>(0.161) | 1.282***<br>(0.090)             | 1.102***<br>(0.128) | 1.495***<br>(0.128) |
| Food groups × expenditure                     | -0.093**<br>(0.043)              | -0.079<br>(0.063)   | -0.127**<br>(0.060) | -0.110***<br>(0.036)            | -0.096*<br>(0.053)  | -0.127**<br>(0.050) |
| <i>Farm household characteristics</i>         |                                  |                     |                     |                                 |                     |                     |
| Off-farm employment                           | 0.160**<br>(0.065)               | 0.104<br>(0.089)    | 0.184*<br>(0.094)   | 0.135**<br>(0.054)              | 0.106<br>(0.075)    | 0.146*<br>(0.077)   |
| Farm size (acres)                             | 0.015*<br>(0.008)                | 0.014<br>(0.011)    | 0.018<br>(0.013)    | 0.013**<br>(0.007)              | 0.012<br>(0.009)    | 0.014<br>(0.010)    |
| Cash crop production                          | 0.161<br>(0.117)                 | 0.300*<br>(0.177)   | 0.039<br>(0.156)    | 0.160*<br>(0.095)               | 0.167<br>(0.139)    | 0.135<br>(0.130)    |

|                         |                    |                     |                   |                   |                    |                   |
|-------------------------|--------------------|---------------------|-------------------|-------------------|--------------------|-------------------|
| Poultry ownership       | 0.085<br>(0.061)   | 0.211***<br>(0.081) | -0.075<br>(0.091) | 0.058<br>(0.050)  | 0.139**<br>(0.068) | -0.036<br>(0.074) |
| Cattle ownership        | 0.206**<br>(0.096) | 0.341***<br>(0.125) | -0.012<br>(0.148) | 0.110<br>(0.079)  | 0.171<br>(0.106)   | 0.044<br>(0.119)  |
| Sheep or goat ownership | -0.057<br>(0.066)  | -0.011<br>(0.089)   | -0.114<br>(0.099) | -0.013<br>(0.055) | 0.036<br>(0.076)   | -0.067<br>(0.081) |

**TABLE SB.3** continued.

| Model specifications          | Dietary diversity score (FVS)    |                     |                     |                                 |                     |                     |
|-------------------------------|----------------------------------|---------------------|---------------------|---------------------------------|---------------------|---------------------|
|                               | Classification on basis of loans |                     |                     | Loan and assets' classification |                     |                     |
|                               | (i)                              | (ii)                | (iii)               | (iv)                            | (v)                 | (vi)                |
| <i>Household demographics</i> |                                  |                     |                     |                                 |                     |                     |
| Age of the household head     | -0.001<br>(0.001)                | 0.0004<br>(0.005)   | -0.001<br>(0.001)   | -0.001<br>(0.001)               | -0.0003<br>(0.005)  | -0.001<br>(0.001)   |
| Household head's education    | 0.007<br>(0.008)                 | 0.006<br>(0.011)    | 0.009<br>(0.012)    | -0.0004<br>(0.007)              | -0.001<br>(0.009)   | 0.002<br>(0.010)    |
| Sex of the household head     |                                  |                     |                     | 3.877**<br>(1.729)              |                     | 3.889**<br>(1.752)  |
| Household size                | 0.135***<br>(0.028)              | 0.117***<br>(0.037) | 0.171***<br>(0.044) | 0.168***<br>(0.023)             | 0.141***<br>(0.032) | 0.197***<br>(0.032) |
| Observations                  | 4,656                            | 2,475               | 2,181               | 7,008                           | 3,597               | 3,411               |
| Adjusted R-squared            | 0.121                            | 0.107               | 0.151               | 0.121                           | 0.099               | 0.149               |
| Overall R-squared             | -0.324                           | -0.351              | -0.285              | -0.323                          | -0.359              | -0.284              |

<sup>f</sup> Expanding the model specification that produced estimation results in Table SB2: Results from including the interaction between household income and food production diversity.

**TABLE SC.1** Estimation results of the household fixed effects model for the calorie intake per capita <sup>g</sup>

| Model specifications                          | Calorie intake per capita (CIC)  |                      |                     |                                 |                      |                      |
|---|----------------------------------|----------------------|---------------------|---------------------------------|----------------------|----------------------|
|   | Classification on basis of loans |                      |                     | Loan and assets' classification |                      |                      |
|   | (i)                              | (ii)                 | (iii)               | (iv)                            | (v)                  | (vi)                 |
| <i>Income &amp; crop production diversity</i> |                                  |                      |                     |                                 |                      |                      |
| Food crop variety                             | 0.060***<br>(0.012)              | 0.062***<br>(0.017)  | 0.059***<br>(0.017) | 0.045***<br>(0.010)             | 0.045***<br>(0.014)  | 0.047***<br>(0.014)  |
| Expenditure per capita (log)                  | 0.358***<br>(0.031)              | 0.310***<br>(0.041)  | 0.418***<br>(0.048) | 0.352***<br>(0.026)             | 0.289***<br>(0.035)  | 0.422***<br>(0.038)  |
| <i>Household demographics</i>                 |                                  |                      |                     |                                 |                      |                      |
| Age of the household head                     | -0.0005<br>(0.001)               | -0.002<br>(0.003)    | -0.0004<br>(0.001)  | -0.0001<br>(0.0005)             | -0.002<br>(0.003)    | 0.00002<br>(0.001)   |
| Household head's education                    | 0.0001<br>(0.005)                | -0.003<br>(0.006)    | 0.003<br>(0.007)    | 0.002<br>(0.004)                | 0.001<br>(0.005)     | 0.002<br>(0.006)     |
| Sex of the household head                     |                                  |                      |                     | 0.272<br>(0.959)                |                      | 0.287<br>(0.975)     |
| Household size                                | -0.092***<br>(0.017)             | -0.123***<br>(0.022) | -0.045*<br>(0.026)  | -0.088***<br>(0.013)            | -0.127***<br>(0.019) | -0.050***<br>(0.019) |

|                    |        |        |        |        |        |        |
|--------------------|--------|--------|--------|--------|--------|--------|
| Observations       | 4,173  | 2,211  | 1,962  | 6,336  | 3,246  | 3,090  |
| Adjusted R-squared | 0.075  | 0.078  | 0.074  | 0.066  | 0.065  | 0.071  |
| Overall R-squared  | -0.391 | -0.389 | -0.395 | -0.404 | -0.406 | -0.398 |

<sup>g</sup> There are 1,391 pooled households [column (i)], 737 credit-unconstrained households [column (ii)], and 654 credit-constrained households [column (iii)] per wave in the loan classification. There are 2,112 total households [column (iv)], 1,082 credit-unconstrained households [column (v)], and 1,030 credit-constrained households [column (vi)] per wave in the loan and asset classification. Standard errors (in parentheses) are clustered at the household level. \*\*\*, \*\*, \* Coefficient is statistically significant at the 1%, 5%, and 10% level, respectively.

**TABLE SC.2** Estimation results of the household fixed effects model for the calorie intake per capita <sup>h</sup>

| Model specifications                          | Calorie intake per capita (CIC)  |                     |                     |                                 |                     |                     |
|---|----------------------------------|---------------------|---------------------|---------------------------------|---------------------|---------------------|
|   | Classification on basis of loans |                     |                     | Loan and assets' classification |                     |                     |
|   | (i)                              | (ii)                | (iii)               | (iv)                            | (v)                 | (vi)                |
| <i>Income &amp; crop production diversity</i> |                                  |                     |                     |                                 |                     |                     |
| Food crop variety                             | 0.062***<br>(0.012)              | 0.065***<br>(0.017) | 0.061***<br>(0.017) | 0.047***<br>(0.010)             | 0.048***<br>(0.014) | 0.048***<br>(0.014) |
| Expenditure per capita (log)                  | 0.360***<br>(0.031)              | 0.311***<br>(0.041) | 0.416***<br>(0.048) | 0.351***<br>(0.026)             | 0.285***<br>(0.035) | 0.423***<br>(0.038) |
| <i>Farm household characteristics</i>         |                                  |                     |                     |                                 |                     |                     |
| Off-farm employment                           | -0.001<br>(0.039)                | -0.010<br>(0.054)   | 0.012<br>(0.057)    | -0.056*<br>(0.032)              | -0.063<br>(0.044)   | -0.051<br>(0.046)   |
| Farm size (acres)                             | 0.001<br>(0.005)                 | 0.001<br>(0.006)    | 0.001<br>(0.008)    | 0.003<br>(0.004)                | 0.002<br>(0.005)    | 0.004<br>(0.006)    |
| Cash crop production                          | -0.032<br>(0.070)                | -0.003<br>(0.107)   | -0.062<br>(0.094)   | -0.074<br>(0.056)               | -0.095<br>(0.083)   | -0.071<br>(0.076)   |
| Poultry ownership                             | 0.019                            | 0.005               | 0.032               | 0.042                           | 0.032               | 0.054               |



|                               |         |          |         |          |         |         |
|-------------------------------|---------|----------|---------|----------|---------|---------|
|                               | (0.036) | (0.048)  | (0.054) | (0.029)  | (0.040) | (0.043) |
| Cattle ownership              | -0.001  | -0.026   | 0.029   | 0.003    | -0.023  | 0.030   |
|                               | (0.057) | (0.074)  | (0.089) | (0.047)  | (0.062) | (0.071) |
| Sheep or goat ownership       | -0.069* | -0.127** | -0.004  | -0.044   | -0.061  | -0.024  |
|                               | (0.039) | (0.053)  | (0.059) | (0.032)  | (0.044) | (0.047) |
| <i>Household demographics</i> |         |          |         |          |         |         |
| Age of the household head     | -0.0005 | -0.003   | -0.0004 | -0.0001  | -0.002  | 0.00003 |
|                               | (0.001) | (0.003)  | (0.001) | (0.0005) | (0.003) | (0.001) |

**TABLE SC.2** continued.

| Model specifications       | Calorie intake per capita (CIC)  |           |         |                                 |           |           |
|----------------------------|----------------------------------|-----------|---------|---------------------------------|-----------|-----------|
|                            | Classification on basis of loans |           |         | Loan and assets' classification |           |           |
|                            | (i)                              | (ii)      | (iii)   | (iv)                            | (v)       | (vi)      |
| Household head's education | -0.00005                         | -0.003    | 0.003   | 0.002                           | 0.001     | 0.002     |
|                            | (0.005)                          | (0.007)   | (0.007) | (0.004)                         | (0.005)   | (0.006)   |
| Sex of the household head  |                                  |           |         | 0.259                           |           | 0.293     |
|                            |                                  |           |         | (0.960)                         |           | (0.977)   |
| Household size             | -0.092***                        | -0.121*** | -0.046* | -0.089***                       | -0.127*** | -0.052*** |
|                            | (0.017)                          | (0.022)   | (0.026) | (0.013)                         | (0.019)   | (0.019)   |
| Observations               | 4,173                            | 2,211     | 1,962   | 6,336                           | 3,246     | 3,090     |
| Adjusted R-squared         | 0.076                            | 0.082     | 0.075   | 0.067                           | 0.068     | 0.073     |
| Overall R-squared          | -0.392                           | -0.388    | -0.401  | -0.403                          | -0.407    | -0.399    |

<sup>h</sup> An extension of the model specification that produced estimation results in Table SC1. That is, results of the estimation with both the farm household variables and household demographic variables.

**TABLE SC.3** Estimation results of the household fixed effects model for the calorie intake per capita <sup>i</sup>

| Model specifications                          | Calorie intake per capita (CIC)  |                     |                     |                                 |                     |                     |
|---|----------------------------------|---------------------|---------------------|---------------------------------|---------------------|---------------------|
|   | Classification on basis of loans |                     |                     | Loan and assets' classification |                     |                     |
|   | (i)                              | (ii)                | (iii)               | (iv)                            | (v)                 | (vi)                |
| <i>Income &amp; crop production diversity</i> |                                  |                     |                     |                                 |                     |                     |
| Food crop variety                             | 0.166**<br>(0.076)               | 0.313***<br>(0.106) | 0.036<br>(0.109)    | 0.107*<br>(0.062)               | 0.278***<br>(0.091) | -0.017<br>(0.087)   |
| Expenditure per capita (log)                  | 0.429***<br>(0.059)              | 0.477***<br>(0.082) | 0.400***<br>(0.088) | 0.391***<br>(0.049)             | 0.438***<br>(0.069) | 0.378***<br>(0.069) |
| Food crops × expenditure                      | -0.021<br>(0.015)                | -0.051**<br>(0.021) | 0.005<br>(0.021)    | -0.012<br>(0.012)               | -0.046**<br>(0.018) | 0.013<br>(0.017)    |
| <i>Farm household characteristics</i>         |                                  |                     |                     |                                 |                     |                     |
| Off-farm employment                           | -0.003<br>(0.039)                | -0.013<br>(0.054)   | 0.012<br>(0.057)    | -0.057*<br>(0.032)              | -0.064<br>(0.044)   | -0.050<br>(0.046)   |
| Farm size (acres)                             | 0.0004<br>(0.005)                | 0.001<br>(0.006)    | 0.001<br>(0.008)    | 0.003<br>(0.004)                | 0.002<br>(0.005)    | 0.004<br>(0.006)    |
| Cash crop production                          | -0.025<br>(0.070)                | 0.001<br>(0.107)    | -0.064<br>(0.094)   | -0.071<br>(0.056)               | -0.093<br>(0.083)   | -0.076<br>(0.077)   |

|                         |                    |                     |                   |                   |                   |                   |
|-------------------------|--------------------|---------------------|-------------------|-------------------|-------------------|-------------------|
| Poultry ownership       | 0.019<br>(0.036)   | 0.002<br>(0.048)    | 0.032<br>(0.054)  | 0.042<br>(0.029)  | 0.030<br>(0.039)  | 0.053<br>(0.043)  |
| Cattle ownership        | -0.0003<br>(0.057) | -0.028<br>(0.074)   | 0.029<br>(0.090)  | 0.003<br>(0.047)  | -0.025<br>(0.062) | 0.028<br>(0.071)  |
| Sheep or goat ownership | -0.068*<br>(0.039) | -0.124**<br>(0.053) | -0.003<br>(0.059) | -0.044<br>(0.032) | -0.059<br>(0.044) | -0.023<br>(0.047) |

**TABLE SC.3** continued.

| Model specifications          | Calorie intake per capita (CIC)  |                      |                    |                                 |                      |                      |
|-------------------------------|----------------------------------|----------------------|--------------------|---------------------------------|----------------------|----------------------|
|                               | Classification on basis of loans |                      |                    | Loan and assets' classification |                      |                      |
|                               | (i)                              | (ii)                 | (iii)              | (iv)                            | (v)                  | (vi)                 |
| <i>Household demographics</i> |                                  |                      |                    |                                 |                      |                      |
| Age of the household head     | -0.0005<br>(0.001)               | -0.003<br>(0.003)    | -0.0004<br>(0.001) | -0.0001<br>(0.0005)             | -0.003<br>(0.003)    | 0.00004<br>(0.001)   |
| Household head's education    | 0.00004<br>(0.005)               | -0.003<br>(0.007)    | 0.003<br>(0.007)   | 0.002<br>(0.004)                | 0.001<br>(0.005)     | 0.002<br>(0.006)     |
| Sex of the household head     |                                  |                      |                    | 0.260<br>(0.960)                |                      | 0.293<br>(0.977)     |
| Household size                | -0.093***<br>(0.017)             | -0.125***<br>(0.022) | -0.046*<br>(0.026) | -0.090***<br>(0.013)            | -0.130***<br>(0.019) | -0.052***<br>(0.019) |
| Observations                  | 4,173                            | 2,211                | 1,962              | 6,336                           | 3,246                | 3,090                |
| Adjusted R-squared            | 0.077                            | 0.086                | 0.075              | 0.068                           | 0.070                | 0.073                |
| Overall R-squared             | -0.392                           | -0.384               | -0.402             | -0.403                          | -0.403               | -0.400               |

<sup>1</sup>Expanding the model specification that yielded estimation results in Table SC2: Results from incorporating the interaction term between income and food production diversity.

**TABLE SD.1** Results of the endogenous switching regression model for the dietary diversity indicator

j

| Model specifications                          | Food variety score (FVS)         |                     |                     |                                 |                     |                     |
|---|----------------------------------|---------------------|---------------------|---------------------------------|---------------------|---------------------|
|   | Classification on basis of loans |                     |                     | Loan and assets' classification |                     |                     |
|   | (i)                              | (ii)                | (iii)               | (iv)                            | (v)                 | (vi)                |
| <i>Income &amp; crop production diversity</i> |                                  |                     |                     |                                 |                     |                     |
| Food crop variety                             | 0.258***<br>(0.079)              | 0.222***<br>(0.079) | 0.513<br>(0.524)    | 0.181***<br>(0.069)             | 0.156**<br>(0.068)  | 0.970**<br>(0.459)  |
| Expenditure per capita (log)                  | 2.310***<br>(0.225)              | 2.291***<br>(0.221) | 2.487***<br>(0.439) | 2.359***<br>(0.197)             | 2.349***<br>(0.193) | 2.892***<br>(0.383) |
| Crop variety × expenditure                    |                                  |                     | -0.059<br>(0.109)   |                                 |                     | -0.164*<br>(0.094)  |
| <i>Farm household characteristics</i>         |                                  |                     |                     |                                 |                     |                     |
| Farm size (acres)                             |                                  | 0.017<br>(0.032)    | 0.017<br>(0.032)    |                                 | 0.006<br>(0.027)    | 0.006<br>(0.027)    |
| Cash crop production                          |                                  | 0.219<br>(0.542)    | 0.225<br>(0.544)    |                                 | 0.080<br>(0.429)    | 0.093<br>(0.430)    |
| Poultry ownership                             |                                  | 0.673***            | 0.669***            |                                 | 0.452**             | 0.442**             |

|                               |         |         |         |         |         |         |
|-------------------------------|---------|---------|---------|---------|---------|---------|
|                               |         | (0.226) | (0.226) |         | (0.193) | (0.193) |
| Cattle ownership              |         | 0.330   | 0.327   |         | 0.205   | 0.192   |
|                               |         | (0.313) | (0.313) |         | (0.268) | (0.268) |
| Sheep or goat ownership       |         | 0.154   | 0.158   |         | 0.165   | 0.174   |
|                               |         | (0.243) | (0.243) |         | (0.213) | (0.213) |
| <i>Household demographics</i> |         |         |         |         |         |         |
| Age of the household head     | 0.012   | 0.014   | 0.014   | 0.018   | 0.019   | 0.019   |
|                               | (0.015) | (0.015) | (0.015) | (0.013) | (0.013) | (0.013) |

**TABLE SD.1** continued.

| Model specifications                     | Food variety score (FVS)         |           |           |                                 |          |          |
|--|----------------------------------|-----------|-----------|---------------------------------|----------|----------|
|  | Classification on basis of loans |           |           | Loan and assets' classification |          |          |
|  | (i)                              | (ii)      | (iii)     | (iv)                            | (v)      | (vi)     |
| Household head 's education              | 0.017                            | 0.017     | 0.017     | -0.012                          | -0.012   | -0.011   |
|  | (0.030)                          | (0.030)   | (0.030)   | (0.026)                         | (0.026)  | (0.026)  |
| Sex of the household head                | -1.377***                        | -0.963*** | -0.966*** | 6.909                           | 6.799    | 6.792    |
|  | (0.300)                          | (0.303)   | (0.304)   | (11.954)                        | (13.293) | (13.340) |
| Household size                           | 0.754***                         | 0.698***  | 0.696***  | 0.733***                        | 0.702*** | 0.698*** |
|  | (0.083)                          | (0.085)   | (0.085)   | (0.070)                         | (0.071)  | (0.071)  |
| <i>Constraints' induced behavior</i>     |                                  |           |           |                                 |          |          |
| Credit : food crop variety               | -0.068                           | -0.051    | -0.036    | -0.001                          | 0.005    | -0.527   |
|  | (0.114)                          | (0.112)   | (0.744)   | (0.096)                         | (0.095)  | (0.616)  |
| Credit : expenditure                     | 0.970***                         | 0.967***  | 0.982     | 0.693**                         | 0.677**  | 0.326    |
|  | (0.326)                          | (0.321)   | (0.614)   | (0.272)                         | (0.266)  | (0.509)  |
| Credit : [Crop variety ×<br>expenditure] |                                  |           | -0.001    |                                 |          | 0.107    |
|  |                                  |           | (0.153)   |                                 |          | (0.126)  |

|                     |       |       |       |       |       |       |
|---------------------|-------|-------|-------|-------|-------|-------|
| Correlated effects? | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |
| Observations        | 4,656 | 4,656 | 4,656 | 7,008 | 7,008 | 7,008 |
| Overall R-squared   | 0.295 | 0.336 | 0.336 | 0.281 | 0.326 | 0.326 |
| Adjusted R-squared  | 0.291 | 0.328 | 0.328 | 0.278 | 0.321 | 0.321 |

<sup>j</sup> The sample has 825 credit-unconstrained households and 727 credit-constrained households per wave in the loan classification. There are 1,199 credit-unconstrained households and 1,137 credit-constrained households per wave in the loan and asset classification. \*\*\*, \*\*, \* Coefficient is significant at the 1%, 5%, and 10% level, respectively.

**TABLE SD.2** Results of the endogenous switching regression model for dietary diversity indicator <sup>k</sup>

| Model specifications                          | Dietary diversity score (DDS)    |                     |                     |                                 |                     |                     |
|---|----------------------------------|---------------------|---------------------|---------------------------------|---------------------|---------------------|
|   | Classification on basis of loans |                     |                     | Loan and assets' classification |                     |                     |
|   | (i)                              | (ii)                | (iii)               | (iv)                            | (v)                 | (vi)                |
| <i>Income &amp; crop production diversity</i> |                                  |                     |                     |                                 |                     |                     |
| Food crop groups                              | 0.127**<br>(0.061)               | 0.090<br>(0.063)    | 0.436<br>(0.448)    | 0.113**<br>(0.052)              | 0.086<br>(0.052)    | 0.543<br>(0.357)    |
| Expenditure per capita (log)                  | 0.914***<br>(0.102)              | 0.910***<br>(0.102) | 1.061***<br>(0.221) | 0.910***<br>(0.085)             | 0.909***<br>(0.085) | 1.106***<br>(0.179) |
| Crop groups × expenditure                     |                                  |                     | -0.070<br>(0.093)   |                                 |                     | -0.092*<br>(0.073)  |
| <i>Farm household characteristics</i>         |                                  |                     |                     |                                 |                     |                     |
| Farm size (acres)                             |                                  | 0.010<br>(0.015)    | 0.010<br>(0.015)    |                                 | 0.007<br>(0.012)    | 0.008<br>(0.012)    |
| Cash crop production                          |                                  | 0.366*<br>(0.204)   | 0.372*<br>(0.205)   |                                 | 0.239<br>(0.161)    | 0.240<br>(0.161)    |
| Poultry ownership                             |                                  | 0.248**             | 0.246**             |                                 | 0.145*              | 0.143*              |

|                               |         |         |         |         |         |         |
|-------------------------------|---------|---------|---------|---------|---------|---------|
|                               |         | (0.101) | (0.101) |         | (0.084) | (0.084) |
| Cattle ownership              |         | 0.306** | 0.305** |         | 0.143   | 0.138   |
|                               |         | (0.148) | (0.148) |         | (0.128) | (0.128) |
| Sheep or goat ownership       |         | 0.010   | 0.014   |         | 0.068   | 0.071   |
|                               |         | (0.108) | (0.108) |         | (0.093) | (0.093) |
| <i>Household demographics</i> |         |         |         |         |         |         |
| Age of the household head     | 0.006   | 0.007   | 0.007   | 0.006   | 0.006   | 0.006   |
|                               | (0.007) | (0.006) | (0.007) | (0.006) | (0.006) | (0.006) |

**TABLE SD.2** continued.

| Model specifications                    | Dietary diversity score (DDS)    |           |           |                                 |          |          |
|---|----------------------------------|-----------|-----------|---------------------------------|----------|----------|
|   | Classification on basis of loans |           |           | Loan and assets' classification |          |          |
|   | (i)                              | (ii)      | (iii)     | (iv)                            | (v)      | (vi)     |
| Household head's education              | 0.006                            | 0.006     | 0.006     | 0.002                           | 0.002    | 0.002    |
|   | (0.013)                          | (0.013)   | (0.013)   | (0.011)                         | (0.011)  | (0.011)  |
| Sex of the household head               | -0.454***                        | -0.340*** | -0.331*** | 4.146                           | 4.058    | 4.075    |
|   | (0.114)                          | (0.117)   | (0.119)   | (7.544)                         | (8.101)  | (8.070)  |
| Household size                          | 0.263***                         | 0.242***  | 0.241***  | 0.250***                        | 0.238*** | 0.238*** |
|   | (0.036)                          | (0.036)   | (0.036)   | (0.029)                         | (0.030)  | (0.030)  |
| <i>Constraints' induced behavior</i>    |                                  |           |           |                                 |          |          |
| Credit : food crop groups               | 0.022                            | 0.051     | 0.371     | 0.040                           | 0.054    | 0.261    |
|   | (0.084)                          | (0.084)   | (0.566)   | (0.070)                         | (0.070)  | (0.451)  |
| Credit : expenditure                    | 0.336***                         | 0.337**   | 0.496*    | 0.319***                        | 0.313*** | 0.414*   |
|   | (0.141)                          | (0.140)   | (0.291)   | (0.115)                         | (0.114)  | (0.233)  |
| Credit : [Crop groups ×<br>expenditure] |                                  |           | -0.062    |                                 |          | -0.041   |
|   |                                  |           | (0.116)   |                                 |          | (0.091)  |

| Correlated effects? | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |
|---------------------|-------|-------|-------|-------|-------|-------|
| Observations        | 4,656 | 4,656 | 4,656 | 7,008 | 7,008 | 7,008 |
| Overall R-squared   | 0.288 | 0.315 | 0.316 | 0.275 | 0.303 | 0.304 |
| Adjusted R-squared  | 0.285 | 0.308 | 0.308 | 0.273 | 0.298 | 0.299 |

<sup>k</sup> The sample has 825 credit-unconstrained households and 727 credit-constrained households per wave in the loan classification. There are 1,199 credit-unconstrained households and 1,137 credit-constrained households per wave in the loan and asset classification. \*\*\*, \*\*, \* Coefficient is significant at the 1%, 5%, and 10% level, respectively.

**TABLE SD.3** Results of the endogenous switching regression model for the calorie intake per capita <sup>1</sup>

| Model specifications                          | Calorie intake per capita (CIC)  |                     |                     |                                 |                     |                     |
|---|----------------------------------|---------------------|---------------------|---------------------------------|---------------------|---------------------|
|   | Classification on basis of loans |                     |                     | Loan and assets' classification |                     |                     |
|   | (i)                              | (ii)                | (iii)               | (iv)                            | (v)                 | (vi)                |
| <i>Income &amp; crop production diversity</i> |                                  |                     |                     |                                 |                     |                     |
| Food crop variety                             | 0.063***<br>(0.019)              | 0.060***<br>(0.019) | 0.075<br>(0.120)    | 0.035**<br>(0.015)              | 0.032**<br>(0.016)  | 0.061<br>(0.103)    |
| Expenditure per capita (log)                  | 0.436***<br>(0.046)              | 0.437***<br>(0.046) | 0.447***<br>(0.090) | 0.400***<br>(0.039)             | 0.397***<br>(0.040) | 0.416***<br>(0.076) |
| Crop variety × expenditure                    |                                  |                     | -0.003<br>(0.024)   |                                 |                     | -0.006<br>(0.020)   |
| <i>Farm household characteristics</i>         |                                  |                     |                     |                                 |                     |                     |
| Farm size (acres)                             |                                  | 0.001<br>(0.008)    | 0.001<br>(0.008)    |                                 | 0.002<br>(0.007)    | 0.002<br>(0.007)    |
| Cash crop production                          |                                  | 0.174<br>(0.149)    | 0.175<br>(0.149)    |                                 | 0.097<br>(0.113)    | 0.097<br>(0.114)    |



|                               |         |          |          |         |         |         |
|-------------------------------|---------|----------|----------|---------|---------|---------|
| Poultry ownership             |         | 0.055    | 0.055    |         | 0.046   | 0.046   |
|                               |         | (0.056)  | (0.056)  |         | (0.047) | (0.047) |
| Cattle ownership              |         | -0.091   | -0.091   |         | -0.077  | -0.078  |
|                               |         | (0.063)  | (0.063)  |         | (0.053) | (0.053) |
| Sheep or goat ownership       |         | -0.131** | -0.131** |         | -0.064  | -0.064  |
|                               |         | (0.060)  | (0.060)  |         | (0.052) | (0.052) |
| <i>Household demographics</i> |         |          |          |         |         |         |
| Age of the household head     | 0.003   | 0.003    | 0.003    | 0.004   | 0.004   | 0.004   |
|                               | (0.004) | (0.004)  | (0.004)  | (0.003) | (0.003) | (0.003) |

**TABLE SD.3** continued.

| Model specifications                 | Calorie intake per capita (CIC)  |          |          |                                 |          |          |
|--------------------------------------|----------------------------------|----------|----------|---------------------------------|----------|----------|
|                                      | Classification on basis of loans |          |          | Loan and assets' classification |          |          |
|                                      | (i)                              | (ii)     | (iii)    | (iv)                            | (v)      | (vi)     |
| Household head 's education          | 0.001                            | -0.0003  | -0.0003  | 0.005                           | 0.005    | 0.005    |
|                                      | (0.008)                          | (0.008)  | (0.008)  | (0.006)                         | (0.006)  | (0.006)  |
| Sex of the household head            | 0.149*                           | 0.089    | 0.088    | 1.360                           | 1.405    | 1.400    |
|                                      | (0.080)                          | (0.080)  | (0.080)  | (1.947)                         | (1.608)  | (1.577)  |
| Household size                       | 0.140***                         | 0.143*** | 0.143*** | 0.144***                        | 0.144*** | 0.144*** |
|                                      | (0.017)                          | (0.017)  | (0.017)  | (0.014)                         | (0.014)  | (0.014)  |
| <i>Constraints' induced behavior</i> |                                  |          |          |                                 |          |          |
| Credit : food crop variety           | -0.023                           | -0.020   | -0.220   | -0.001                          | 0.005    | -0.238   |
|                                      | (0.028)                          | (0.028)  | (0.181)  | (0.023)                         | (0.023)  | (0.149)  |
| Credit : expenditure                 | 0.190***                         | 0.186**  | 0.050    | 0.204***                        | 0.212*** | 0.047    |
|                                      | (0.074)                          | (0.074)  | (0.140)  | (0.061)                         | (0.061)  | (0.114)  |
| Credit : [Crop variety ×             |                                  |          | 0.040    |                                 |          | 0.049*   |

|                     |       |       |         |       |       |         |
|---------------------|-------|-------|---------|-------|-------|---------|
| expenditure]        |       |       | (0.036) |       |       | (0.030) |
| Correlated effects? | Yes   | Yes   | Yes     | Yes   | Yes   | Yes     |
| Observations        | 4,173 | 4,173 | 4,173   | 6,336 | 6,336 | 6,336   |
| Overall R-squared   | 0.213 | 0.233 | 0.233   | 0.212 | 0.231 | 0.232   |
| Adjusted R-squared  | 0.208 | 0.224 | 0.224   | 0.209 | 0.225 | 0.226   |

<sup>1</sup> The sample has 737 credit-unconstrained households and 654 credit-constrained households per wave in the loan classification. There are 1,082 credit-unconstrained households and 1,030 credit-constrained households per wave in the loan and asset classification. \*\*\*, \*\*, \* Coefficient is significant at the 1%, 5%, and 10% level, respectively.

**TABLE E** Summary statistics for other variables

| Variables                                     | W1:2010-11 |      | W2:2012-13 |      | W3:2015-16 |      | Compounded annual growth rate |       |       |
|---|------------|------|------------|------|------------|------|-------------------------------|-------|-------|
|   | Mean       | SD   | Mean       | SD   | Mean       | SD   | W1-W2                         | W2-W3 | W1-W3 |
| PANEL A: Credit-constrained households        |            |      |            |      |            |      |                               |       |       |
| <i>Farm household characteristics</i>         |            |      |            |      |            |      |                               |       |       |
| Off-farm employment (OFE) (1=yes, 0=no)       | 0.51       | 0.50 | 0.49       | 0.50 | 0.46       | 0.50 | −1.00                         | −1.26 | −1.46 |
| Farm size (FS) (acres)                        | 2.54       | 4.21 | 2.26       | 3.49 | 2.19       | 3.21 | −2.88                         | −0.63 | −2.10 |
| Cash crop production (CCP) (1=yes, 0=no)      | 0.08       | 0.26 | 0.10       | 0.30 | 0.09       | 0.28 | 5.74                          | −2.09 | 1.70  |
| Poultry ownership (PWN) (1=yes, 0=no)         | 0.42       | 0.49 | 0.47       | 0.50 | 0.48       | 0.50 | 2.85                          | 0.42  | 1.93  |
| Cattle ownership (CWN) (1=yes, 0=no)          | 0.15       | 0.35 | 0.16       | 0.36 | 0.16       | 0.36 | 1.63                          | 0.00  | 0.93  |
| Sheep or goats ownership (SGN) (1=yes, 0=no)  | 0.40       | 0.49 | 0.45       | 0.50 | 0.47       | 0.50 | 2.99                          | 0.87  | 2.33  |
| <i>Household demographics</i>                 |            |      |            |      |            |      |                               |       |       |
| Household size (HSIZE)                        | 6.50       | 3.11 | 7.07       | 3.33 | 7.88       | 3.59 | 2.12                          | 2.19  | 2.79  |
| Age of the household head (AGE) (years)       | 54.0       | 58.1 | 53.3       | 14.7 | 54.3       | 14.0 | −0.33                         | 0.37  | 0.08  |
| Education of the household head (EDC) (years) | 11.9       | 3.73 | 12.2       | 3.89 | 12.6       | 3.65 | 0.62                          | 0.65  | 0.82  |
| Household-head sex (SEX) (1=male; 0=female)   | 0.89       | 0.31 | 0.89       | 0.31 | 0.89       | 0.31 | 0.00                          | 0.00  | 0.00  |

**TABLE E** continued.

| Variables                                     | W1:2010-11 |      | W2:2012-13 |      | W3:2015-16 |      | Compounded annual growth rate |       |       |
|---|------------|------|------------|------|------------|------|-------------------------------|-------|-------|
|   | Mean       | SD   | Mean       | SD   | Mean       | SD   | W1-W2                         | W2-W3 | W1-W3 |
| PANEL B: Credit-unconstrained households      |            |      |            |      |            |      |                               |       |       |
| <i>Farm household characteristics</i>         |            |      |            |      |            |      |                               |       |       |
| Off-farm employment (OFE) (1=yes, 0=no)       | 0.56       | 0.50 | 0.52       | 0.50 | 0.51       | 0.50 | -1.84                         | -0.39 | -1.33 |
| Farm size (FS) (acres)                        | 2.79       | 4.52 | 2.56       | 3.40 | 2.57       | 3.48 | -2.12                         | 0.08  | -1.17 |
| Cash crop production (CCP) (1=yes, 0=no)      | 0.05       | 0.22 | 0.07       | 0.26 | 0.09       | 0.28 | 8.78                          | 5.15  | 8.76  |
| Poultry ownership (PWN) (1=yes, 0=no)         | 0.42       | 0.49 | 0.48       | 0.50 | 0.53       | 0.50 | 3.39                          | 2.00  | 3.38  |
| Cattle ownership (CWN) (1=yes, 0=no)          | 0.22       | 0.41 | 0.22       | 0.41 | 0.22       | 0.41 | 0.00                          | 0.00  | 0.00  |
| Sheep or goats ownership (SGN) (1=yes, 0=no)  | 0.45       | 0.50 | 0.52       | 0.50 | 0.55       | 0.50 | 3.68                          | 1.13  | 2.91  |
| <i>Household demographics</i>                 |            |      |            |      |            |      |                               |       |       |
| Household size (HSIZE)                        | 6.40       | 3.06 | 6.91       | 3.17 | 7.80       | 3.51 | 1.94                          | 2.45  | 2.87  |
| Age of the household head (AGE) (years)       | 49.5       | 14.7 | 52.2       | 14.5 | 53.8       | 14.2 | 1.34                          | 0.61  | 1.20  |
| Education of the household head (EDC) (years) | 12.1       | 3.76 | 12.5       | 3.75 | 12.7       | 3.65 | 1.34                          | 0.32  | 0.69  |
| Household-head sex (SEX) (1=male; 0=female)   | 0.91       | 0.29 | 0.91       | 0.29 | 0.91       | 0.29 | 0.00                          | 0.00  | 0.00  |

*Note:* There are 1,137 credit-constrained households and 1,199 credit-unconstrained households per wave.

**TABLE F** Results of the endogenous switching regression model for GES policy assessment on FVS <sup>m</sup>

| Model specifications                  | Food variety score (FVS) |                    |                   |                     |                     |                     |
|---------------------------------------|--------------------------|--------------------|-------------------|---------------------|---------------------|---------------------|
|                                       | Beneficiaries            |                    |                   | Non-beneficiaries   |                     |                     |
|                                       | (i)                      | (ii)               | (iii)             | (iv)                | (v)                 | (vi)                |
| Food crop variety                     | −0.141<br>(0.354)        | −0.262<br>(0.394)  | −0.606<br>(2.254) | 0.235***<br>(0.082) | 0.231***<br>(0.082) | 0.551<br>(0.545)    |
| Expenditure per capita (log)          | 2.084**<br>(0.951)       | 2.176**<br>(0.886) | 1.914<br>(1.792)  | 2.413***<br>(0.211) | 2.413***<br>(0.207) | 2.632***<br>(0.432) |
| Crop variety × expenditure            |                          |                    | 0.074<br>(0.480)  |                     |                     | −0.065<br>(0.112)   |
| Credit : food crop variety            | 0.520<br>(0.426)         | 0.633<br>(0.473)   | −0.041<br>(3.602) | −0.049<br>(0.117)   | −0.043<br>(0.115)   | 0.144<br>(0.748)    |
| Credit : expenditure                  | 1.573***<br>(1.361)      | 1.442<br>(1.326)   | 0.957<br>(3.063)  | 0.770**<br>(0.313)  | 0.765**<br>(0.305)  | 0.917<br>(0.611)    |
| Credit : [Crop variety × expenditure] |                          |                    | 0.141<br>(0.749)  |                     |                     | −0.039<br>(0.156)   |
| Farm characteristics?                 | No                       | Yes                | Yes               | No                  | Yes                 | Yes                 |

<sup>m</sup> The sample has 70 credit-constrained households and 59 credit-unconstrained households per wave in the beneficiaries' column (i), (ii), and (iii). There are 739 households with binding credit constraints and 804 households with unbinding credit constraints per wave in the non-beneficiaries: Column (iv), (v), and (vi). Each regression accounts for household demographics and household and time fixed effects. Standard errors (in parentheses) are clustered at the household level.

\*\*\*, \*\*, \* Coefficient is statistically significant at the 1%, 5%, and 10% level, respectively.

**TABLE G** Results of the endogenous switching regression model for GES policy assessment on DDS <sup>n</sup>

| Model specifications                 | Dietary diversity score (DDS) |                    |                   |                     |                     |                     |
|--------------------------------------|-------------------------------|--------------------|-------------------|---------------------|---------------------|---------------------|
|                                      | Beneficiaries                 |                    |                   | Non-beneficiaries   |                     |                     |
|                                      | (i)                           | (ii)               | (iii)             | (iv)                | (v)                 | (vi)                |
| Food crop groups                     | 0.284<br>(0.340)              | 0.195<br>(0.382)   | −1.645<br>(1.804) | 0.195***<br>(0.064) | 0.183**<br>(0.065)  | 0.218<br>(0.389)    |
| Expenditure per capita (log)         | 0.877**<br>(0.428)            | 0.877**<br>(0.434) | 0.088<br>(0.932)  | 0.960***<br>(0.093) | 0.965***<br>(0.092) | 0.980***<br>(0.195) |
| Crop groups × expenditure            |                               |                    | 0.387<br>(0.396)  |                     |                     | −0.007<br>(0.078)   |
| Credit : food crop groups            | −0.038<br>(0.410)             | 0.029<br>(0.446)   | 2.441<br>(2.749)  | −0.052<br>(0.089)   | −0.040<br>(0.089)   | 0.503<br>(0.525)    |
| Credit : expenditure                 | 0.760***<br>(0.561)           | 0.744<br>(0.578)   | 1.788<br>(1.377)  | 0.364***<br>(0.133) | 0.358***<br>(0.131) | 0.609**<br>(0.276)  |
| Credit : [Crop groups × expenditure] |                               |                    | −0.505<br>(0.581) |                     |                     | −0.109<br>(0.106)   |
| Farm characteristics?                | No                            | Yes                | Yes               | No                  | Yes                 | Yes                 |

<sup>n</sup> The sample has 70 credit-constrained households and 59 credit-unconstrained households per wave in the beneficiaries' column (i), (ii), and (iii). There are 739 households with binding credit constraints and 804 households with unbinding credit constraints per wave in the non-beneficiaries: Column (iv), (v), and (vi). Each regression accounts for household demographics and household and time fixed effects. Standard errors (in parentheses) are clustered at the household level.

\*\*\*, \*\*, \* Coefficient is statistically significant at the 1%, 5%, and 10% level, respectively.

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