Supplementary Data

Table S1: Decision making score for adolescent males and females in DHS 2014 data

| Variables | Sex |  |
|-----------|-----|---|
|           | Female | Male |
| Index of attitude toward wife beating |  |  |
| Wife beating is justified if: |  |  |
| 1. Goes out without telling him | √ | √ | 5 |
| 2. Neglects the children | √ | √ | 6 |
| 3. Argues with him | √ | √ | 7 |
| 4. Refuses to have sex with him | √ | √ | 8 |
| 5. Burns the food | √ | √ | 9 |
| The maximum attainable score for attitude toward wife beating | 5 | 5 |
| Index of property ownership: |  |  |
| 1. Owns a house alone or jointly | √ | √ | 10 |
| 2. Owns land alone or jointly | √ | √ | 11 |
| The maximum attainable score for property ownership | 2 | 2 |
| Summated empowerment index | 7 | 7 |

Table S2: Scoring format from responses for decision-making indexes

| Index of attitude toward wife beating scoring format | Index of property ownership scoring format |
|-----------------------------------------------------|------------------------------------------|
| No=1 | Does not own=0 |
| Yes =0 | Alone only=1 |
| | Jointly only=1 |
| | Both alone and jointly=1 |
Table S3: Improved household water, hygiene and sanitation index (WASH)

| No | Variable                                                                 | Score |
|----|--------------------------------------------------------------------------|-------|
| 1  | **Household water index (WI): score range 0-3**                          |       |
| 1.1| Improved source of drinking                                               |       |
|    |  Piped water supply into the dwelling                                   | 1     |
|    |  Piped water to a yard/plot                                              |       |
|    |  Public tap/standpipe                                                   |       |
|    |  Tube well/borehole                                                     |       |
|    |  Protected dug well                                                     |       |
|    |  Protected spring                                                       |       |
|    |  Rainwater                                                              |       |
|    |  If the source of drinking water is packaged/sachet-water or bottled and|       |
|    | source of non-drinking water is improved                                 |       |
|    |  Any other water source                                                 | 0     |
| 1.2| Round-trip time in water haulage between household and water source      |       |
|    |  If the time spent ≤ 30 minutes                                          | 1     |
|    |  If time spent > 30 minutes                                              | 0     |
| 1.3| Anything done to water to make it safe for drinking by household         |       |
|    |  Any treatment (boiling, bleach/chlorine, filter, strain through cloth, |       |
|    |   camphor/naphthalene, solar disinfection, purification tablet, stand     | 1     |
|    |   and settle or other treatment)                                         |       |
|    |  No treatment                                                           | 0     |
| 2  | **Household sanitation index (HSI): score range 0-2**                    |       |
| 2.1| Improved household sanitation facility using the type of toilet          |       |
|    |  Flush/pour-flush toilet or latrine that flushes to a sewer, septic     | 1     |
|    |   tank or pit                                                            |       |
|    |  Ventilated improved pit (VIP) latrine                                 |       |
|    |  Pit latrines with the pit well covered by a slab                       |       |
|    |  Composting toilets are also considered improved                        |       |
|    |  Any other toilet                                                       | 0     |
| 2.2| The household does not share toilet facility with others                 | 1     |
| 3  | **Household hygiene index (HHI): score range 0-3**                      |       |
| 3.1| If the household has a place for washing hands                           | 1     |
| 3.2| Presence of water at a handwashing place in the household                | 1     |
| 3.3| Soap and other detergents available for hand washing in household        | 1     |
| 4  | Maximum attainable score for household water, hygiene, and sanitation    | 8     |
Table S4. Multivariate Predictors of Height-For-Age Z-Score (HAZ) and Body-Mass-Index-For-Age Z-Score (BAZ): A Comparative Analysis for Adolescent Boys and Girls from the 2014 Ghana Demographic Health Survey (GDHS) Data

| Variables                                        | HAZ                  | BAZ                  |
|--------------------------------------------------|----------------------|----------------------|
|                                                  | Girls (n=857)        | Boys (n=870)         | Pooled (n=1727) | Girls (n=857) | Boys (n=870) | Pooled (n=1727) |
|                                                  | Estimate (β)         | S.E (β)              | Estimate (β)   | S.E (β)       | Estimate (β) | S.E (β)       |
| Sex                                              | Boy                  | -0.17                | 0.13           | -0.27**       | 0.14         |
|                                                  | Girl                 | Ref.                 |                | Ref.          |              |               |
| Age                                              | -0.08***             | 0.03                 |                |               |              |               |
| Girl Menstruated in the last 6 weeks             | Yes                  | 0.41***              | 0.13           |               |               |               |
|                                                  | No                   | Ref.                 |                |               |              |               |
| Adolescent has experienced first sex             | Yes                  | 0.22***              | 0.07           | 0.14***       | 0.04         | 0.18**        | 0.07          | 0.34****      | 0.08         | 0.23****     | 0.05         |
|                                                  | No                   | Ref.                 |                | Ref.          |              |               |
| Adolescent has a child                           | Yes                  | -0.36***             | 0.13           | 0.51**        | 0.26         |
|                                                  | No (Ref.)            | Ref.                 |                |               |              |               |
| Interaction term sex* adolescent has a child     | Girl *Has a child    | -0.39**              | 0.16           |               |              |               |
| Highest educational level of girl                | No education         | -0.38***             | 0.16           | 0.29          | 0.22         | -0.10         | 0.13          |
|                                                  | Primary school       | -0.21**              | 0.09           | -0.35***      | 0.10         | -0.26****     | 0.06          |
|                                                  | Secondary education /Higher | Ref. | Ref. | Ref. |              |               |               |
| Ethnicity                                        | Akan                 | -0.14**              | 0.06           |               |              |               |
|                                                  | Mole-Dagbani         | 0.05                 | 0.07           |               |              |               |
|                                                  | Other                | Ref.                 |                |               |              |               |
| Marital status                                   | Currently married    | -0.69**              | 0.30           |               |              |               |
| Never married | Empowerment score | 0.06** | 0.03 | Ref. | 0.07** | 0.03 |
|---------------|------------------|--------|------|------|--------|------|
| **An interaction term for** | **sex*empowerment score** | | | | | |
| Girl * empowerment score | | | | | | |
| Water, hygiene and sanitation score | | 0.06** | 0.02 | | 0.09** | 0.03 |
| **Household wealth index** | | | | | | |
| Poorest | -0.21* | 0.11 | -0.29** | 0.12 | -0.16 | 0.10 | -0.42**** | 0.11 | -0.21 | 0.13 | -0.33**** | 0.08 |
| Poorer | -0.27**** | 0.11 | -0.43**** | 0.13 | -0.27*** | 0.10 | -0.44**** | 0.11 | -0.37*** | 0.13 | -0.43**** | 0.09 |
| Middle | -0.24** | 0.12 | -0.30** | 0.13 | -0.23** | 0.11 | -0.15 | 0.12 | -0.29** | 0.14 | -0.22** | 0.09 |
| Richer | -0.08 | 0.12 | -0.16 | 0.12 | -0.10 | 0.12 | -0.16 | 0.14 | -0.02 | 0.14 | -0.09 | 0.09 |
| Richest | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| **An interaction term for Sex * Household Wealth Quintile** | | | | | | |
| Boy* Poorest | -0.35** | 0.15 | | | | | | | | | |
| Boy*Poorer | -0.33** | 0.16 | | | | | | | | | |
| Boy*Middle | -0.21 | 0.18 | | | | | | | | | |
| Boy*Richer | -0.15 | 0.17 | | | | | | | | | |
| Boy*Richest | Ref. | | | | | | | | | | |
| **Agro-ecological zone** | | | | | | |
| Coastal savannah | -0.09 | 0.08 | | | | | | | | | |
| Guinea/Sudan savannah | 0.19* | 0.10 | | | | | | | | | |
| Forest | Ref. | | | | | | | | | | |
| **Model Fit Statistics** | | | | | | |
| R-Square | 0.07 | 0.09 | 0.11 | 0.07 | 0.07 | 0.17 |
| Root MSE | 0.85 | 0.88 | 0.87 | 0.85 | 0.78 | 0.82 |
| Model (F-Value) | 3.80*** | 7.49*** | 10.51**** | 6.01**** | 5.63*** | 29.38*** |

Ref, Reference group; *P≤0.1; **P≤0.05; ***P≤0.01; ****P≤0.001
Table S5. Multivariate Predictors of Blood Pressure: A Comparative Analysis for Adolescent Boys and Girls from the 2014 Ghana Demographic Health Survey (GDHS) Data

| Variables                                      | Systolic blood pressure |                          | Diastolic blood pressure |                          |
|------------------------------------------------|-------------------------|--------------------------|--------------------------|--------------------------|
|                                                | Girls (n=857)           | Boys (n=870)             | Pooled (n=1727)          | Girls (n=857)            | Boys (n=870)             | Pooled (n=1727)          |
|                                                | Estimate (β)            | S.E (β)                  | Estimate (β)             | S.E (β)                  | Estimate (β)             | S.E (β)                  | Estimate (β)             | S.E (β)                  |
| Sex                                            | Boy                     | 3.35**                   | 1.49                     | -1.56***                 | 0.49                     |
|                                                | Girl                    | Ref.                     |                          |                          |                          |                          |                          |                          |
| Age                                            | 1.37****                | 0.34                     | 0.74****                 | 0.21                     | 0.32*                    | 0.17                     | 0.40**                   | 0.17                     |
| Adolescent has experienced first sex           | Yes                     | -2.34**                  | 1.09                     | 2.89***                  | 1.12                     | -0.46                    | 0.85                     |                          |
|                                                | No                      | Ref.                     |                          |                          | Ref.                     |                          |                          |                          |
| Interaction term sex* experienced first sex    | Girl*experienced first   | 3.84***                  | 1.26                     |                          |                          |                          |                          |                          |
|                                                | first sex               |                          |                          |                          |                          |                          |                          |                          |
| Adolescent has a child                         | Yes                     | 18.22****                | 1.61                     | -2.47**                  | 1.10                     |
|                                                | No                      | Ref.                     |                          |                          | Ref.                     |                          |                          |                          |
| Adolescent exercised in the past 10 minutes    | Yes                     | 4.08***                  | 1.47                     |                          |                          |                          |                          |                          |
|                                                | No                      | Ref.                     |                          |                          | Ref.                     |                          |                          |                          |
| Ate in the past 10 minutes                     | Yes                     | 2.55****                 | 0.81                     | 1.69***                  | 0.61                     |
|                                                | No                      | Ref.                     |                          |                          | Ref.                     |                          |                          |                          |
| Had coffee in the past 10 minutes              | Yes                     | 6.39****                 | 1.23                     | -2.49                    | 2.22                     |
|                                                | No                      | Ref.                     |                          |                          | Ref.                     |                          |                          |                          |
| An interaction term for sex*had coffee in the  | Boy * had coffee in the  | 8.32***                  | 2.61                     |                          |                          |                          |                          |                          |
| past 10 minutes                                | past 10 minutes         |                          |                          |                          |                          |                          |                          |                          |
minutes
Frequency of fruit intake in the past week
Visited a health facility in the last 6 months
Yes
No
Marital status
Currently married
Formerly married
Never married
Household owns land usage for agriculture
Yes
No
Household wealth index
Poorest
Poorer
Middle
Richer
Richest
An interaction term for Sex *
Household Wealth Quintile
Boy* Poorest
Boy*Poorer
Boy*Middle
Boy*Richer
Boy*Richest
Agro-ecological zone
Coastal savannah
Guinea/Sudan savannah
Forest
BAZ category
Underweight
Overweight
|  | **P>| | ***P>| | ****P>| |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Frequency of fruit intake in the past week | 0.32 | 0.17 |
| Visited a health facility in the last 6 months | Yes | -2.25*** | 0.79 |
| Marital status | N/A | -21.70**** | 5.88 |
| | Formerly married | N/A | N/A |
| | Never married | Ref. | N/A |
| Household owns land usage for agriculture | Yes | -1.44** | 0.69 |
| | No | Ref. | N/A |
| Household wealth index | Poorest | 5.84**** | 1.40 | 1.06 | 1.48 |
| | Poorer | 1.45 | 1.41 | -0.88 | 1.50 |
| | Middle | 1.92 | 1.27 | 1.00 | 1.51 |
| | Richer | 1.63 | 1.27 | 0.28 | 1.48 |
| | Richest | Ref. | Ref. |
| An interaction term for Sex * | Boy* Poorest | 3.91** | 1.75 |
| | Boy*Poorer | 2.25 | 1.93 |
| | Boy*Middle | 1.14 | 1.88 |
| | Boy*Richer | 1.40 | 1.88 |
| | Boy*Richest | Ref. | Ref. |
| Agro-ecological zone | Coastal savannah | 1.90** | 0.93 | 1.07 | 0.69 |
| | Guinea/Sudan savannah | -3.48** | 1.53 | -2.68*** | 0.93 |
| | Forest | Ref. | Ref. |
| | Ref. | Ref. |
| BAZ category | Underweight | -6.90 | 5.19 | -2.53 | 1.29 | -3.67** | 1.88 |
| | Overweight | 2.98*** | 1.02 | 4.71**** | 1.39 | 3.14**** | 0.97 | 1.98*** | 0.76 | 1.35* | 0.78 |
| | Ref. | Ref. | Ref. | Ref. | 2.04** | 1.51 | 2.68* | 1.53 | -2.11**** | 0.63 | -0.52 | 0.55 |
| Normal weight | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
|---------------|------|------|------|------|------|------|
| Adolescent is stunted | | | | | | |
| Yes | -3.86*** | 1.25 | -3.23*** | 1.09 | | |
| No | Ref. | | Ref. | | | |
| Agro-ecological zone | | | | | | |
| Coastal savannah | -0.48 | 0.55 | Ref. | | | |
| Guinea/Sudan savannah | -1.97**** | 0.61 | Ref. | | | |
| Forest | Ref. | | | | | |
| Model Fit Statistics | | | | | | |
| R-Square | 0.04 | 0.15 | 0.15 | 0.01 | 0.02 | 0.03 |
| Root MSE | 9.99 | 10.46 | 10.30 | 8.01 | 8.05 | 8.01 |
| Model (F-Value) | 5.83**** | 35.99**** | 16.76**** | 4.39** | 3.58**** | 5.32**** |

Ref, Reference group; *P≤ 0.1; ** P≤0.05; ***P≤0.01; **** P≤0.001; BAZ, Body-mass index-for-age Z-score; N/A, not applicable because none of the Boy adolescents was formerly married; N/A, none of the adolescent boys was formerly married