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Technical note on the calculation of sub-national Gender Inequality Index (GII) for the Mekong countries

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INTRODUCTION

The Gender Inequality Index (GII) is introduced by UNDP in 2010 to measure inequalities between women and men in three dimensions of human development: reproductive health, empowerment and labour market. In which, reproductive health is measured by maternal mortality ratio and adolescent birth rates; empowerment is measured by the share of parliamentary seats by each sex, and population with at least some secondary education; labor market is measured by labor force participation rate (UNDP 2020)

The sub-national GI is based on the original UNDP’s GI. However, due to the unavailability of data at the sub-national level, the datasets for the calculation of GI are slightly varies between the countries. More importantly, we add ‘gender-based violence’ and ‘intra-household power dynamics’ to the GI and empowerment dimensions respectively because they reflect social norms and gender status, crucial measurements of gender inequality.

CALCULATION METHOD

GI is derived from Reproductive Health Index, Labour Force Index, Empowerment Index and Violence Index.

Here,

$$GII = 1 - \frac{HARM(G_f, G_m)}{G_{\bar{f}, \bar{m}}}$$

Where, $G_{\bar{f}, \bar{m}}$ = Geometric mean of arithmetic means for each indicator

$HARM(G_f, G_m)$ = harmonic mean of each gender group

Harmonic mean: Harmonic mean used to aggregate dimensions across the gender groups. The female and male indices are aggregated by the harmonic mean to create the equally distributed gender index. Using the harmonic mean of within-group geometric means captures the inequality between women and men and adjusts for association between dimensions—that is, it accounts for the overlapping inequalities in dimensions.

$$HARM(G_f, G_m) = \left[\frac{(G_f)^{-1} + (G_m)^{-1}}{2} \right]^{-1}$$

Where, G_f and G_m are the geometric means aggregated across dimensions within each gender group

$$G_f = \sqrt[3]{RHI \times EI \times LFI}$$

$$G_m = \sqrt[3]{1 \times EI \times LFI}$$

In case Violence Index is calculated,

$$G_f = \sqrt[4]{RHI \times EI \times LFI \times VI}$$

$$G_m = \sqrt[4]{1 \times EI \times LFI \times VI}$$

Geometric mean: geometric mean of the arithmetic means for each indicator The reference standard for computing inequality is obtained by aggregating female and male indices using equal weights (thus treating the genders equally) and then aggregating the indices across dimensions (for each gender)

$$G_{\bar{f},\bar{m}} = \sqrt[3]{\overline{RHI} \times \overline{EI} \times \overline{LFI}}$$

In case Violence Index is calculated,

$$G_{\bar{f},\bar{m}} = \sqrt[4]{\overline{RHI} \times \overline{EI} \times \overline{LFI} \times \overline{VI}}$$

Where, RHI = Reproductive Health Index

EI = Empowerment Index

LFI = Labour Force Index

VI = Violence Index

Calculations for country-specific indices are explain in the following sections.

Calculating Cambodia's sub-national GII

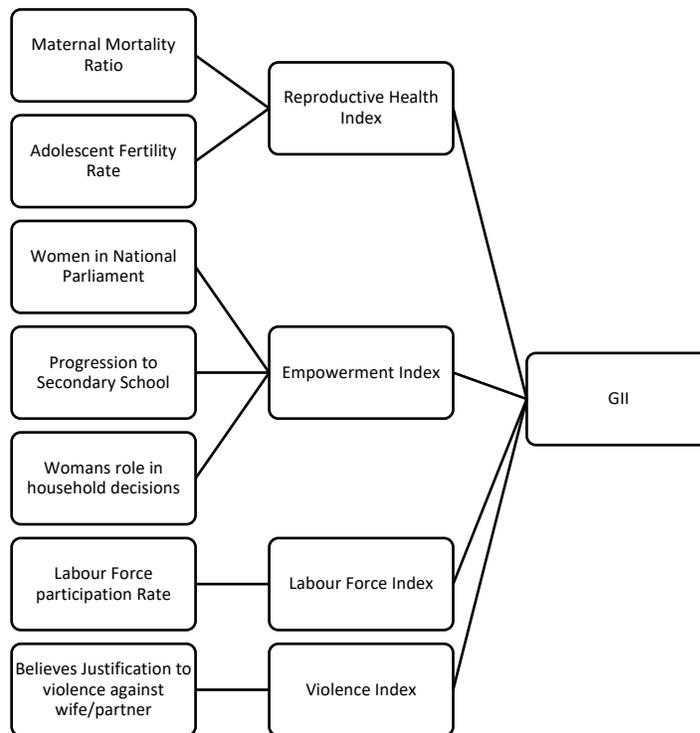


Figure 1: Cambodia's sub-national GII

1. Reproductive Health Index (RHI):

Data sources:

- Maternal Mortality Ratio *MMR*: Maternal mortality refers to death due to complications from pregnancy or childbirth. Higher maternal mortality suggests poorer maternal health. It also shows the ability of a country to create conditions and support for maternal health (WHO).
- Adolescent Fertility Rate *AFR*: The number of births to women aged 15-19 years per 1,000 women in that age group. It is also referred to as the age-specific fertility rate for women aged 15-19.

Calculation of the RHI:

$$RHI_f = \sqrt{MR * \left(\frac{1}{AFR}\right)}$$

$$RHI_m = 1$$

Where, *MR* (Maternal Ratio) is calculated using logic below

if $MMR < 10$ then $MR = 1/10$

if $MMR > 1000$ then $MR = 1/1000$

if $10 > MMR < 1000$ then $MR = 10/MMR$

2. Empowerment Index (EI): This dimension is measured by three aspects: political participation, education, and intra-household decision-making.

Data sources:

- Proportion of seats held by women in national parliaments (%) $NAT_PARLIMENT_f$: The proportion of seats held by women in national parliaments is the number of seats held by women members in single or lower chambers of national parliaments, expressed as a percentage of all occupied seats; it is derived by dividing the total number of seats occupied by women by the total number of seats in parliament.
- Progression to secondary school, female (%) $PROG_SEC_SCH_f$: Progression to secondary school refers to the number of new entrants to the first grade of secondary school in a given year as a percentage of the number of students enrolled in the final grade of primary school in the previous year (minus the number of repeaters from the last grade of primary education in the given year).
- Progression to secondary school, male (%) $PROG_SEC_SCH_m$: Progression to secondary school refers to the number of new entrants to the first grade of secondary school in a given year as a percentage of the number of students enrolled in the final grade of primary school in the previous year (minus the number of repeaters from the last grade of primary education in the given year).
- Role/Involvement of women in household decision making $WOM_DECISION$: Women's role in household decisions shows women's stature and dynamics of society at macro level. This parameter can be determined based on multiple parameters. Married women aged 15-49 role in decision making (jointly or singly) or having final say about her own health care, making large purchases and visits to family, relatives, friends.

Calculation of the EI:

$$EI_f = \sqrt[3]{\left(\frac{NAT_PARLIMENT_f}{100}\right) * \left(\frac{PROG_SEC_SCH_f}{100}\right) * \left(\frac{WOM_DECISION}{100}\right)}$$

$$EI_m = \sqrt{\left(\frac{NAT_PARLIMENT_m}{100}\right) * \left(\frac{PROG_SEC_SCH_m}{100}\right)}$$

Where, $NAT_PARLIMENT_m = 100 - NAT_PARLIMENT_f$

3. Labour Force Index (LFI): This dimension is measured by employment opportunities open to women and men in labour market, using data on the percentage of women/men who are employed, or actively seeking employment.

Data sources:

- Labor force participation rate, female $LABF_PARTI_NAT_EST_f$: Labor force participation rate is the proportion of the population ages 15 and older that is economically active: all people who supply labor for the production of goods and services during a specified period. This is a national estimate for % of female population of age 15 and above.
- Labor force participation rate, male $LABF_PARTI_NAT_EST_m$: Labor force participation rate is the proportion of the population ages 15 and older that is economically active: all people who supply labor for the production of goods and services during a specified period. This is a national estimate for % of male population of age 15 and above.

Calculation of the LFI:

$$LFI_f = \frac{LABF_PARTI_NAT_EST_f}{100}$$

$$LFI_m = \frac{LABF_PARTI_NAT_EST_m}{100}$$

4. Violence Index (VI): This dimension is measured by the perception of domestic violence. Gender Based Violence reflects social norms and collective mindsets toward the status and roles of women and men.

Data source:

- Population believes violence is justified VIO_JUSTIF : Population between age of 15-49 believe a husband is justified in beating his wife/partner for any of the following reasons: She argues with him, burns the food, goes out without telling him, neglects children, refuses sex with him or asks him to use a condom.

Calculation of the VI:

$$VI_f = \frac{1}{VIO_JUSTIF}$$

$$VI_m = 1$$

Calculating Lao's sub-national GII

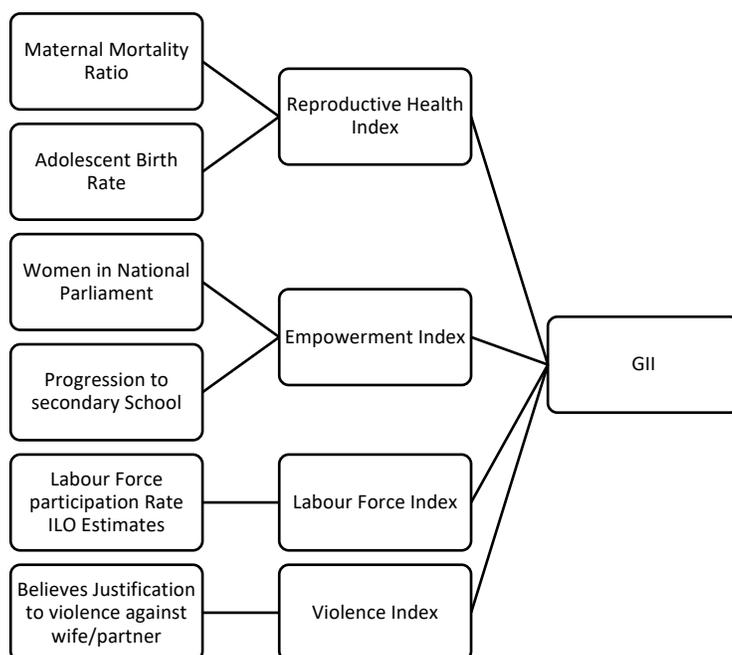


Figure 2: Lao's sub-national GII

1. Reproductive Health Index (RHI):

Data sources:

- Maternal Mortality Ratio *MMR*: Maternal mortality refers to death due to complications from pregnancy or childbirth. Higher maternal mortality suggests poorer maternal health. It also shows the ability of a country to create conditions and support for maternal health (Human Development Index, 2014).
- Adolescent Birth Rate *ABR*: The adolescent birth rate measures the annual number of births to women 15 to 19 years of age per 1,000 women in that age group. The adolescent birth rate is generally computed as a ratio. The numerator is the number of live births to women 15 to 19 years of age, and the denominator an estimate of the number of person-years lived by women at ages 15 to 19 during the same period of time. It is expressed as births per 1,000 women. ([definition link](#))

Calculation of the RHI:

$$RHI_f = \sqrt{MR * \left(\frac{1}{ABR}\right)}$$

$$RHI_m = 1$$

Where, *MR* (Maternal Ratio) is calculated using logic below

if $MMR < 10$ then $MR = 1/10$

if $MMR > 1000$ then $MR = 1/1000$

if $10 > MMR < 1000$ then $MR = 10/MMR$

2. Empowerment Index (EI): This dimension is measured by two aspects: political participation and education.

Data sources:

- Proportion of seats held by women in national parliaments (%) $NAT_PARLIMENT_f$: The proportion of seats held by women in national parliaments is the number of seats held by women members in single or lower chambers of national parliaments, expressed as a percentage of all occupied seats; it is derived by dividing the total number of seats occupied by women by the total number of seats in parliament.
- Progression to secondary school, female (%) $PROG_SEC_SCH_f$: Progression to secondary school refers to the number of new entrants to the first grade of secondary school in a given year as a percentage of the number of students enrolled in the final grade of primary school in the previous year (minus the number of repeaters from the last grade of primary education in the given year).
- Progression to secondary school, male (%) $PROG_SEC_SCH_m$: Progression to secondary school refers to the number of new entrants to the first grade of secondary school in a given year as a percentage of the number of students enrolled in the final grade of primary school in the previous year (minus the number of repeaters from the last grade of primary education in the given year).

Calculation of the EI:

$$EI_f = \sqrt{\left(\frac{NAT_PARLIMENT_f}{100}\right) * \left(\frac{PROG_SEC_SCH_f}{100}\right)}$$

$$EI_m = \sqrt{\left(\frac{NAT_PARLIMENT_m}{100}\right) * \left(\frac{PROG_SEC_SCH_m}{100}\right)}$$

Where, $NAT_PARLIMENT_m = 100 - NAT_PARLIMENT_f$

3. Labour Force Index (LFI): This dimension is measured by employment opportunities open to women and men in labour market, using data on the percentage of women/men who are employed, or actively seeking employment.

Data sources:

- Labor force participation rate, female $LABF_PARTI_ILO_EST_f$: Labor force participation rate is the proportion of the female population ages 15-64 that is economically active: all people who supply labor for the production of goods and services during a specified period. This is an ILO estimate for % of female population of age 15 and above.
- Labor force participation rate, male $LABF_PARTI_ILO_EST_m$: Labor force participation rate is the proportion of the male population ages 15-64 that is economically active: all people who supply labor for the production of goods and services during a specified period. This is an ILO estimate for % of male population of age 15 and above.

Calculation of the LFI:

$$LFI_f = \frac{LABF_PARTI_ILO_EST_f}{100}$$

$$LFI_m = \frac{LABF_PARTI_ILO_EST_m}{100}$$

4. Violence Index (VI): This dimension is measured by the perception of domestic violence. Gender Based Violence reflects social norms and collective mindsets toward the status and roles of women and men.

Data source:

- Population believes violence is justified *VIO_JUSTIF*: Population between age of 15-49 believe a husband is justified in beating his wife/partner for any of the following reasons: She argues with him, burns the food, goes out without telling him, neglects children, refuses sex with him.

Calculation of the LFI:

$$VI_f = \frac{1}{VIO_JUSTIF}$$

$$VI_m = 1$$

Calculating Myanmar's sub-national GII

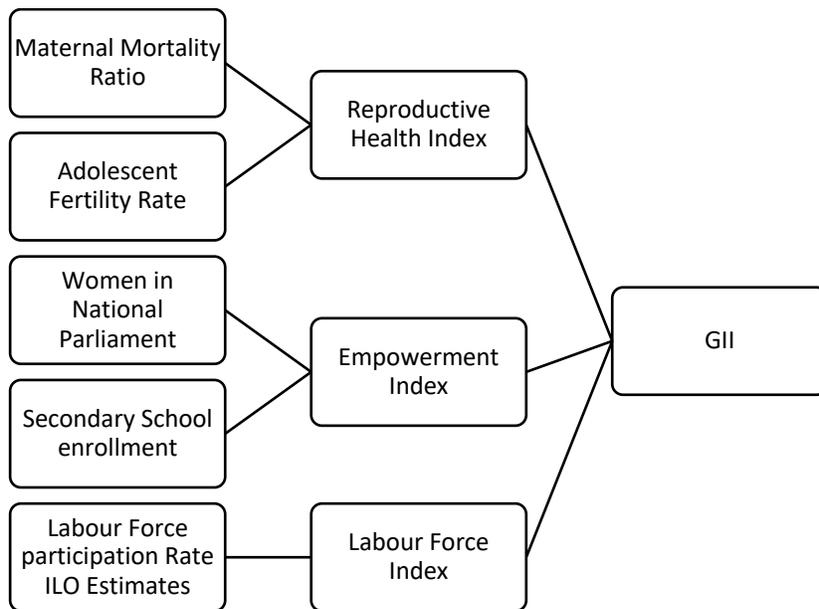


Figure 3: Myanmar's sub-national GII

1. Reproductive Health Index (RHI):

Data sources:

- Maternal Mortality Ratio *MMR*: Maternal mortality refers to death due to complications from pregnancy or childbirth. Higher maternal mortality suggests poorer maternal health. It also shows the ability of a country to create conditions and support for maternal health (Human Development Index, 2014).
- Adolescent Fertility Rate *AFR*: The number of births to women aged 15-19 years per 1,000 women in that age group. It is also referred to as the age-specific fertility rate for women aged 15-19.

Calculation of the RHI:

$$RHI_f = \sqrt{MR * \left(\frac{1}{AFR}\right)}$$

$$RHI_m = 1$$

Where, *MR* (Maternal Ratio) is calculated using logic below

if *MMR* < 10 then *MR* = 1/10

if *MMR* > 1000 then *MR* = 1/1000

if 10 > *MMR* < 1000 then *MR* = 10/*MMR*

- ### 2. Empowerment Index (EI):
- This dimension is measured by two aspects: political participation and education.

Data sources:

- Proportion of seats held by women in national parliaments (%) $NAT_PARLIMENT_f$: The proportion of seats held by women in national parliaments is the number of seats held by women members in single or lower chambers of national parliaments, expressed as a percentage of all occupied seats; it is derived by dividing the total number of seats occupied by women by the total number of seats in parliament.
- Secondary school enrollment, female (%) $EDU_SEC_SCH_f$: Gross enrollment ratio is the ratio of total female enrollment, regardless of age, to the female population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers.
- Secondary school enrollment, male (%) $EDU_SEC_SCH_m$: Gross enrollment ratio is the ratio of total male enrollment, regardless of age, to the male population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers.

Calculation of the EI:

$$EI_f = \sqrt{\left(\frac{NAT_PARLIMENT_f}{100}\right) * \left(\frac{ENROL_SCH_f}{100}\right)}$$
$$EI_m = \sqrt{\left(\frac{NAT_PARLIMENT_m}{100}\right) * \left(\frac{ENROL_SCH_m}{100}\right)}$$

Where, $NAT_PARLIMENT_m = 100 - NAT_PARLIMENT_f$

3. Labour Force Index (LFI): This dimension is measured by employment opportunities open to women and men in labour market, using data on the percentage of women/men who are employed, or actively seeking employment.

Data sources:

- Labor force participation rate, female $LABF_PARTI_ILO_EST_f$: Labor force participation rate is the proportion of the female population ages 15-64 that is economically active: all people who supply labor for the production of goods and services during a specified period. This is an ILO estimate for % of female population of age 15 and above.
- Labor force participation rate, male $LABF_PARTI_ILO_EST_m$: Labor force participation rate is the proportion of the male population ages 15-64 that is economically active: all people

who supply labor for the production of goods and services during a specified period. This is an ILO estimate for % of male population of age 15 and above.

Calculation of the LFI:

$$LFI_f = \frac{LABF_PARTI_ILO_EST_f}{100}$$

$$LFI_m = \frac{LABF_PARTI_ILO_EST_m}{100}$$

Calculating Myanmar's sub-national GII

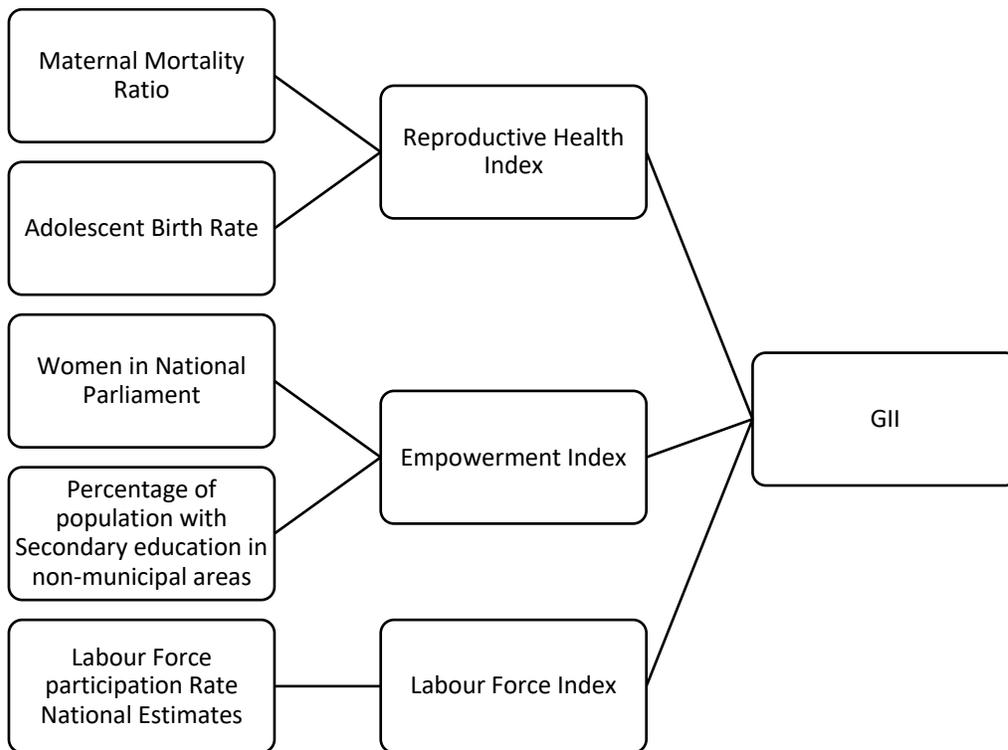


Figure 4: Thailand's sub-national GII

1. Reproductive Health Index (RHI):

Data sources:

- **Maternal Mortality Ratio *MMR*:** Maternal mortality refers to death due to complications from pregnancy or childbirth. Higher maternal mortality suggests poorer maternal health. It also shows the ability of a country to create conditions and support for maternal health (Human Development Index, 2014).
- **Adolescent Birth Rate *ABR*:** The adolescent birth rate measures the annual number of births to women 15 to 19 years of age per 1,000 women in that age group. The adolescent birth rate is generally computed as a ratio. The numerator is the number of live births to women 15 to 19 years of age, and the denominator an estimate of the number of person-years lived by women at ages 15 to 19 during the same period of time. It is expressed as births per 1,000 women. ([definition link](#))

Calculation of the RHI:

$$RHI_f = \sqrt{MR * \left(\frac{1}{ABR}\right)}$$

$$RHI_m = 1$$

Where, *MR* (Maternal Ratio) is calculated using logic below

if *MMR* < 10 then *MR* = 1/10

if *MMR* > 1000 then *MR* = 1/1000

if 10 > *MMR* < 1000 then *MR* = 10/*MMR*

2. Empowerment Index (EI): This dimension is measured by two aspects: political participation and education.

Data sources:

- Proportion of seats held by women in national parliaments (%) *NAT_PARLIMENT_f*: The proportion of seats held by women in national parliaments is the number of seats held by women members in single or lower chambers of national parliaments, expressed as a percentage of all occupied seats; it is derived by dividing the total number of seats occupied by women by the total number of seats in parliament.
- Population with Secondary education in non-municipal areas, female (%) *EDU_SEC_SCH_f*: Percentage of female population living in non-municipal (rural) areas having secondary education. This is derived from female population age 15 and above with education level of secondary school by the total female population of age 15 and above.
- Population with Secondary education in non-municipal areas, male (%) *EDU_SEC_SCH_m*: Percentage of male population living in non-municipal (rural) areas having secondary education. This is derived from male population age 15 and above with education level of secondary school by the total male population of age 15 and above.

Calculation of the EI:

$$EI_f = \sqrt{\left(\frac{NAT_PARLIMENT_f}{100}\right) * \left(\frac{EDU_SEC_SCH_f}{100}\right)}$$

$$EI_m = \sqrt{\left(\frac{NAT_PARLIMENT_m}{100}\right) * \left(\frac{EDU_SEC_SCH_m}{100}\right)}$$

Where, *NAT_PARLIMENT_m* = 100 - *NAT_PARLIMENT_f*

3. Labour Force Index (LFI): This dimension is measured by employment opportunities open to women and men in labour market, using data on the percentage of women/men who are employed, or actively seeking employment.

Data sources:

- Labor force participation rate, female *LABF_PARTI_NAT_EST_f*: Labor force participation rate is the proportion of the population ages 15 and older that is economically active: all

people who supply labor for the production of goods and services during a specified period. This is a national estimate for % of female population of age 15 and above.

- Labor force participation rate, male $LABF_PARTI_NAT_EST_m$: Labor force participation rate is the proportion of the population ages 15 and older that is economically active: all people who supply labor for the production of goods and services during a specified period. This is a national estimate for % of male population of age 15 and above.

Calculation of the LFI:

$$LFI_f = \frac{LABF_PARTI_NAT_EST_f}{100}$$

$$LFI_m = \frac{LABF_PARTI_NAT_EST_m}{100}$$

Calculating Vietnam's sub-national GII:

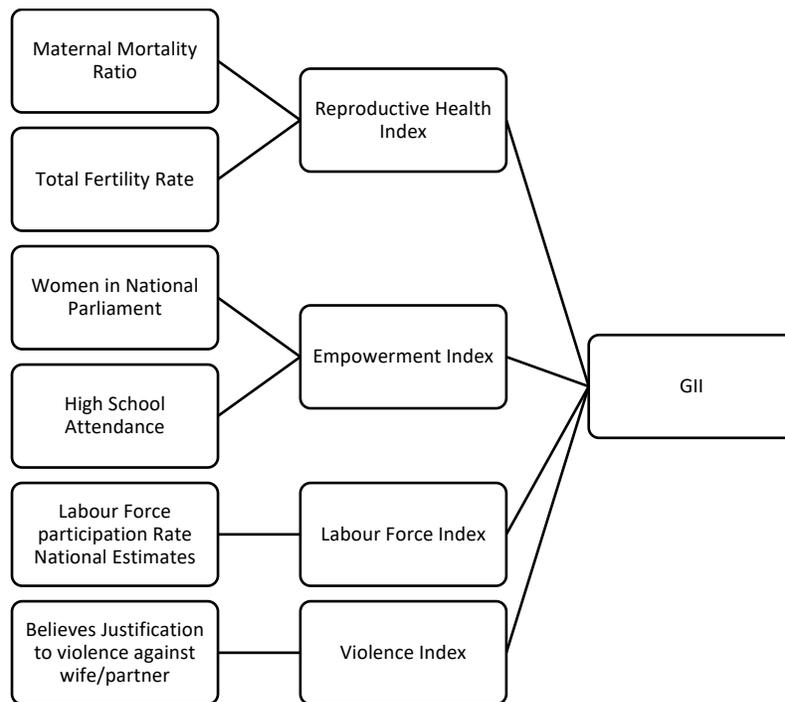


Figure 5: Vietnam sub-national GII

1. Reproductive Health Index (RHI)

Data sources:

- Maternal Mortality Ratio *MMR*: Maternal mortality refers to death due to complications from pregnancy or childbirth. Higher maternal mortality suggests poorer maternal health. It also shows the ability of a country to create conditions and support for maternal health (Human Development Index, 2014).
- Total Fertility Rate *TFR*: Total fertility rate represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with age-specific fertility rates of the specified year.

Calculation of the RHI:

$$RHI_f = \sqrt{MR * \left(\frac{1}{TFR}\right)}$$

$$RHI_m = 1$$

Where, *MR* (Maternal Ratio) is calculated using logic below

if $MMR < 10$ then $MR = 1/10$

if $MMR > 1000$ then $MR = 1/1000$

if $10 > MMR < 1000$ then $MR = 10/MMR$

- ### 2. Empowerment Index (EI):
- This dimension is measured by two aspects: political participation and education.

Data sources:

- Proportion of seats held by women in national parliaments (%) $NAT_PARLIMENT_f$: The proportion of seats held by women in national parliaments is the number of seats held by women members in single or lower chambers of national parliaments, expressed as a percentage of all occupied seats; it is derived by dividing the total number of seats occupied by women by the total number of seats in parliament.
- Male High School attendance $HIGH_SCH_ATT_m$: Percentage of male age 16-18 attending high school from the total male population of age 16-18.
- Female High School attendance $HIGH_SCH_ATT_f$: Percentage of female age 16-18 attending high school from the total female population of age 16-18.

Calculation of the EI:

$$EI_f = \sqrt{\left(\frac{NAT_PARLIMENT_f}{100}\right) * \left(\frac{HIGH_SCH_ATT_f}{100}\right)}$$

$$EI_m = \sqrt{\left(\frac{NAT_PARLIMENT_m}{100}\right) * \left(\frac{HIGH_SCH_ATT_m}{100}\right)}$$

Where, $NAT_PARLIMENT_m = 100 - NAT_PARLIMENT_f$

3. Labour Force Index (LFI): This dimension is measured by employment opportunities open to women and men in labour market, using data on the percentage of women/men who are employed, or actively seeking employment.

Data sources:

- Labor force participation rate, female $LABF_PARTI_NAT_EST_f$: Labor force participation rate is the proportion of the population ages 15 and older that is economically active: all people who supply labor for the production of goods and services during a specified period. This is a national estimate for % of female population of age 15 and above.
- Labor force participation rate, male $LABF_PARTI_NAT_EST_m$: Labor force participation rate is the proportion of the population ages 15 and older that is economically active: all people who supply labor for the production of goods and services during a specified period. This is a national estimate for % of male population of age 15 and above.

Calculation of the LFI:

$$LFI_f = \frac{LABF_PARTI_NAT_EST_f}{100}$$

$$LFI_m = \frac{LABF_PARTI_NAT_EST_m}{100}$$

4. Violence Index (VI): This dimension is measured by the perception of domestic violence. Gender Based Violence reflects social norms and collective mindsets toward the status and roles of women and men.

Data sources:

- Population believes violence is justified *VIO_JUSTIF*: Population between age of 15-49 believe a husband is justified in beating his wife/partner for any of the following reasons: She argues with him, burns the food, goes out without telling him, neglects children, refuses sex with him or asks him to use a condom.

Calculation of the VI:

$$VI_f = \frac{1}{VIO_JUSTIF}$$

$$VI_m = 1$$

References:

UNDP (2020). *HDR Technical Note*. UNDP.

https://hdr.undp.org/sites/default/files/hdr2020_technical_notes.pdf