Annex 1: Zero-to-one scoring transformation

For the purpose of aggregation, indicators were classified into two groups: Group A and Group B (Table). Group A consists of indicators with values that increase with a decrease (from more developed to less developed) in the level of performance among the districts. Group B consists of indicators with values that increase with increase (from less developed to more developed) in the level of performance among the districts. In order to aggregate the indicators of these two groups, it is essential to transform each indicator's values into scores/ranks in such a way that each indicator has the following common property: an increase in scores of an indicator corresponds to an increase in performance among districts. In this study, the zero-to-one scoring transformation was used.

Table: Indicators classified as Group A or Group B

Group A The higher the value of the indicator the less-developed the district $d_{ij} = (max_i - x_{ij})/(max_i - min_i)$		Group B The higher the value of the indicator the more developed the district $d_{ij} = (x_{ij} - min_i)/(max_i - min_i)$	
Child illiteracy rate	5CILR	Adult gender imbalance ratio in literacy status	GIRLR
Child economic activity rate	CLABR	Adult gender imbalance ratio in non-agricultural occupations	GIRE
Proportion of child marriage	CMMAR	Per capita food production	PCFA
Percentage of educationally disadvantaged population	PEDEGP	Contraceptive prevalence rate	CPR
Percentage of marginal farm households	PLM	Drinking water coverage	WATER
		Toilet facility	TOILET
		Agricultural credit	ACREDIT
		Farm size	FARMSIZE
		Livestock per farm household	LIVE
		Percentage of irrigated area	IAPAA
		Road density	ROAD
		Bank density	BANK
		Cooperatives density	COOP
		Health institutions density	PHI
		Post office density	PPO
		Percentage of forest user households	FORESTHH
		Per capita regular budget expenditure	PCREXP
		Per capita development budget expenditure	PCDEXP
		Overall literacy rate	LR
		Broad occupational structure	EMPS
		Percentage share of females in literacy	FLR
		Percentage share of females in non-agricultural occupations	PWNAG
		Percentage share of females teachers at primary level	F_TEACH
		Percentage share of girls enrolled at primary level	G_ENR

Zero-to-one scoring transformation: The original 75 values of each indicator were transformed into 75 scores by a rule that depends on whether the indicator belongs to Group A or Group B.

Let x_{ij} be the value of the jth indicator in the ith district.
Let $max_j = max\{x_{ij}\}$ and $min_j = min\{x_{ij}\}$ correspondingly denote the maximum and minimum values over 75 district of the jth indicator.

Each indicator's values for Group A are transformed by the following rule.
$$d_{ij} = (max_j - x_{ij})/(max_j - min_j)$$
where d_{ij} is the score corresponding to x_{ij}.

This rule maps the smallest value of the indicator to one and the largest value to zero, and other values to between zero and one, preserving the ordering in reverse order (increase in value implies decrease in score).

Each indicator's values for Group B are transformed by the following rule.
$$d_{ij} = (x_{ij} - min_j)/(max_j - min_j)$$
where d_{ij} is the score corresponding to x_{ij}.

This rule maps the smallest value of the indicator to zero and the largest value to one, and other values to between zero and one, preserving the ordering in the same order (increase in value implies increase in score).

All scores are free from a unit of measurement, and vary from zero to one.

Weighted indicators: In this study, the following nine indices or weighted indicators were constructed by aggregating or, equivalently, summing the weighted scores of appropriate basic indicators.

Child Deprivation Index (CDI)
Gender Discrimination Index (GDI)
Health and Development Index (HDI)
Primary Sector Development Index (PSDI)
Infrastructural Development Index (IDI)
Poverty and Deprivation Index (POVDEPI)
Socioeconomic and Infrastructural Development Index (SEIDI)
Women's Empowerment Index (WEI)
Overall Composite Index (OCI)

The weighted indicators were constructed by aggregating the scores of basic indicators or indices in the following manner.

$$CDI = \frac{5CILR + CLABR + CMMAR}{3}$$

$$GDI = \frac{GIRLR + GIRE}{2}$$

$$HDI = \frac{CPR + WATER + TOILET}{3}$$

$$PSDI = \frac{ACREDIT + FARMSIZE + LIVE + IAPAA}{4}$$

$$IDI = \frac{ROAD + BANK + COOP + PHI + PPO + FORESTHH + PCREXP + PCDEXP}{8}$$

$$POVDEPI = \frac{CDI + GDI + PEDEGP + PLM + PCFA}{5}$$

$$SEIDI = \frac{HDI + PSDI + IDI + LR + EMPS}{5}$$

CDI	=	**Child Deprivation Index**
5CILR	=	Child Illiteracy Rate
CLABR	=	Child Economic Activity Rate
CMMAR	=	Proportion of Child Marriage
GDI	=	**Gender Discrimination Index**
GIRLR	=	Adult Gender Imbalance Ratio in Literacy
GIRE	=	Adult Gender Imbalance Ratio in Non-agricultural Occupations
HDI	=	**Health And Development Index**
CPR	=	Contraceptive Prevalence Rate
WATER	=	Drinking Water Coverage
TOILET	=	Toilet Facilities
PSDI	=	**Primary Sector Development Index**
ACREDIT	=	Agricultural Credit
FARMSIZE	=	Farm Size
LIVE	=	Livestock per Farm Household
IAPAA	=	Percentage of Irrigated Area
IDI	=	**Infrastructure Development Index**
ROAD	=	Road Density
BANK	=	Bank Density
COOP	=	Cooperatives Density
PHI	=	Health Institutions Density
PPO	=	Post Office Density
FORESTHH	=	Forest User Households
PCREXP	=	Per Capita Regular Budget Expenditure
PCDEXP	=	Per Capita Development Budget Expenditure
POVDEPI	=	**Poverty and Deprivation Index**
CDI	=	Child Deprivation Index
GDI	=	Gender Discrimination Index
PEDEGP	=	Educationally Disadvantaged Population
PLM	=	Marginal Farm Households
PCFA	=	Per Capita Food Production
SEIDI	=	**Socioeconomic and Infrastructural Development Index**
HDI	=	Health and Development Index
PSDI	=	Primary Sector Development Index
IDI	=	Infrastructure Development Index
LR	=	Overall Literacy Rate
EMPS	=	Broad Occupational Structure

$$WEI = \frac{FLR + PWNAG + F\_TEACH + G\_ENR}{4}$$

$$OCI = \frac{POVDEPI + SEIDI + WEI}{3}$$

WEI = **Women's Empowerment Index**
FLR = Share of Females in Literacy
PWNAG = Share of Females in Non-agricultural Occupations
F_TEACH = Share of Female Teachers at Primary Level
G_ENR = Share of Girls' Enrolment at Primary Level

OCI = **Overall Composite Index**
POVDEPI = Poverty and Deprivation Index
SEIDI = Socioeconomic and Infrastructural Development Index
WEI = Women's Empowerment Index