Formal Regionalization based on HDI Index of the Districts

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Course Title: Regional Planning Studio

Submitted by-

Group: 2

Student Id: 1815002, 1815028, 1815029

Level-4/Term-1

Submitted to

Dr. Mohammad Abdul Mohit, Professor

Dr. Dipita Hossain, Assistant Professor
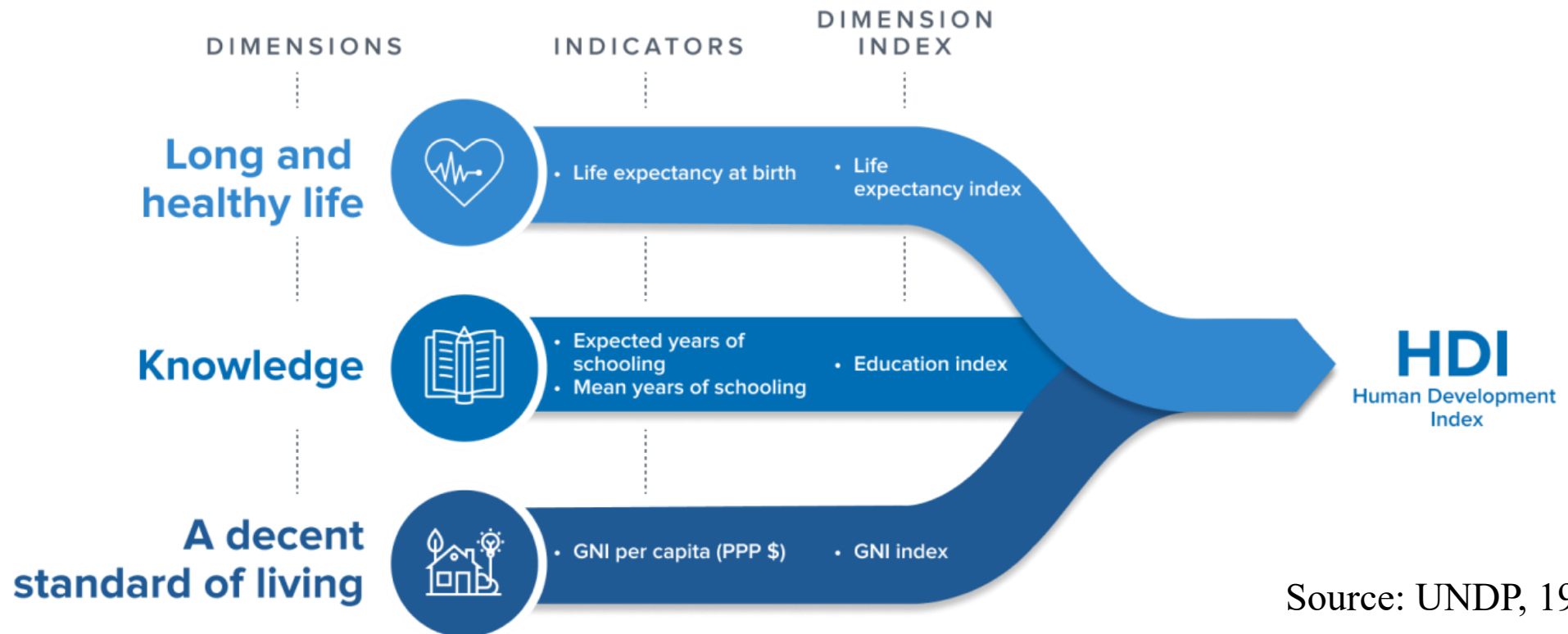
Meher Afjun Faria, Lecturer

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Background

Three dimensions are essential for people:
1. To lead a long and healthy life,
2. To acquire knowledge
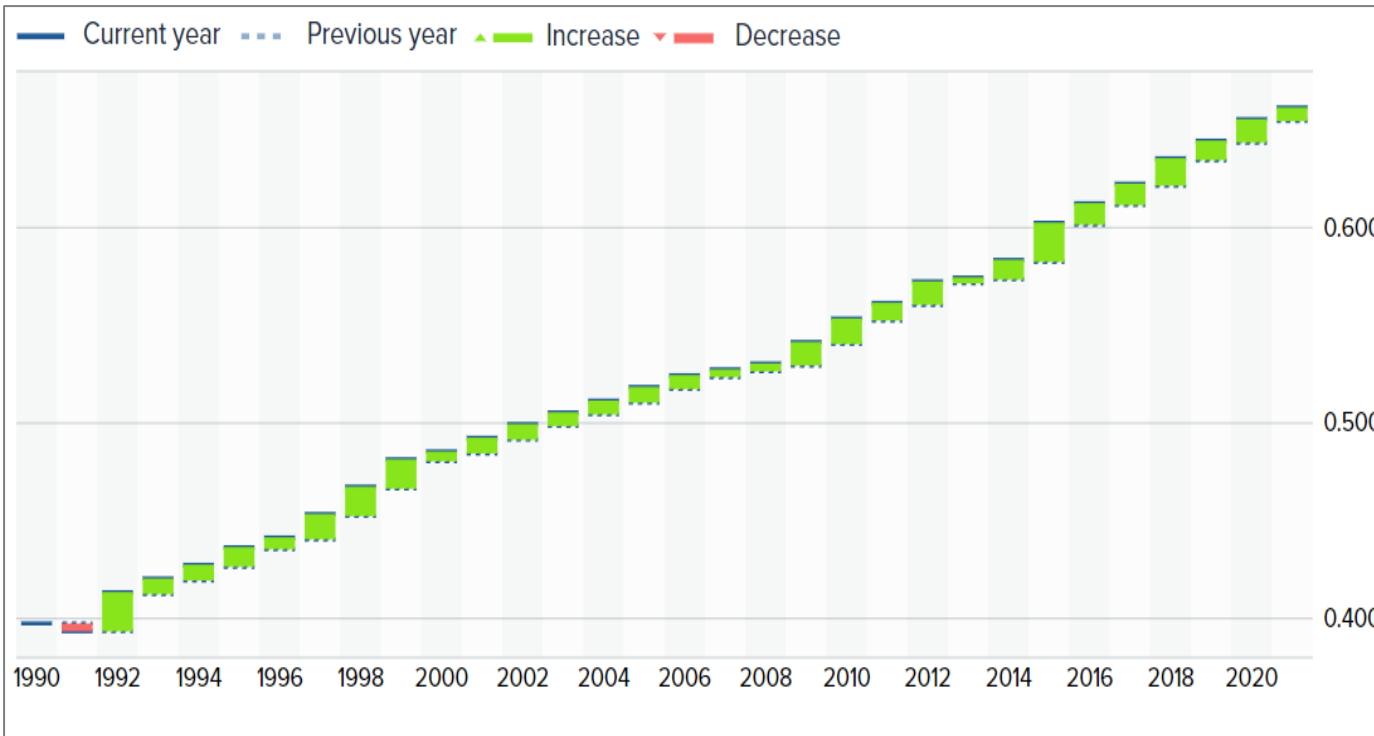3. To have access to resources for a decent standard of living

The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development (UNDP, 1990).
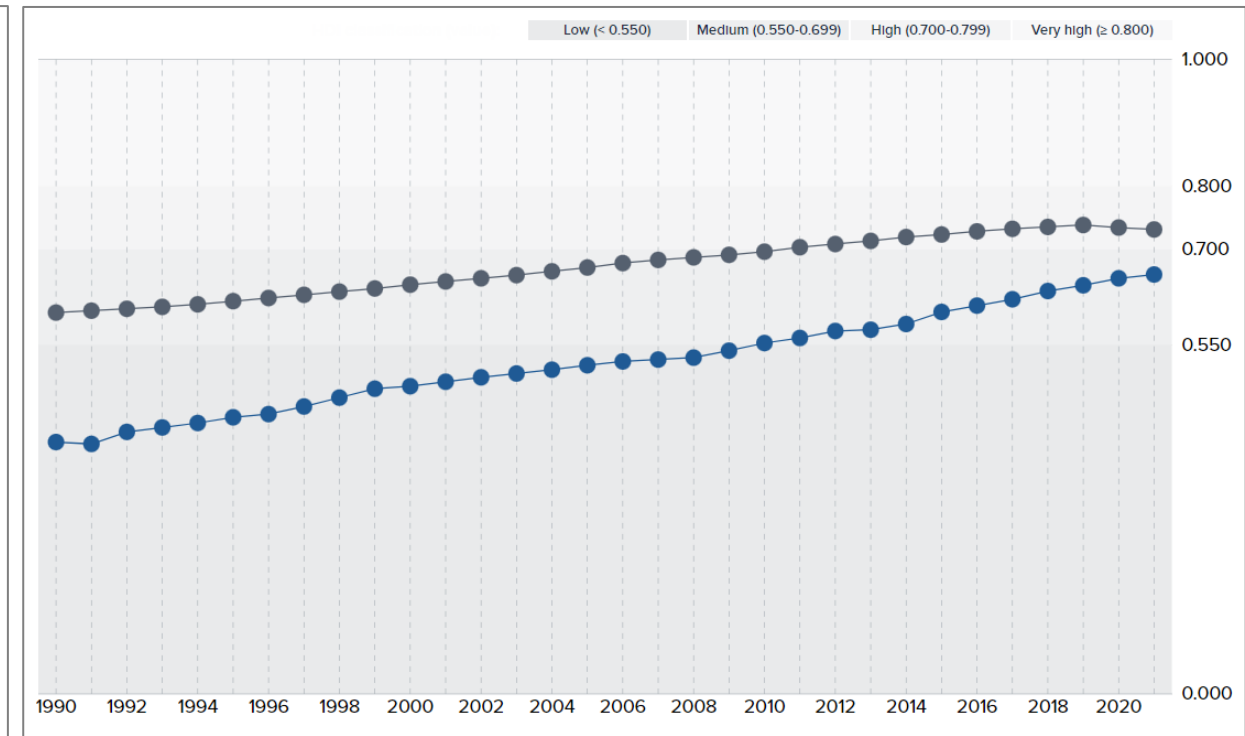

Source: UNDP, 1990

□ **Trends in Bangladesh's HDI (1990 – 2021**

□ **Comparison between Bangladesh and Global HDI Index (1990 – 2021)**

Source: UNDP, 2021

Source: UNDP, 2021

✓ Bangladesh's Human Development Index has increased gradually from 1990 to 2021

✓ Gap between Bangladesh and Global HDI index is reducing.

It is important to determine HDI index for the districts of Bangladesh to have an overview of human development condition within the country.

Methodology

❑ **Study Area Selection:** 64 Districts of Bangladesh

❑ **Data Collection**

Human Development Index (HDI)			Data Source
Dimension	**Selected Variable**	**Nature of Indicator**	
Health	Crude Death Rate	Negative	Bangladesh Sample Vital Statistics, 2020
Education	Literacy Rate	Positive	Population and Hosing Census, 2022
Standard of living	Consumption	Positive	Household Income and Expenditure Survey, 2016

❑ **Data Analysis**

$$Death\ Rate\ Index = 1 - \frac{(Actual\ Value - Minimum\ Value)}{(Maximum\ - Minimum\ Value)}$$

$$Literacy\ Rate\ Index = \frac{(Actual\ Value - Minimum\ Value)}{(Maximum\ - Minimum\ Value)}$$

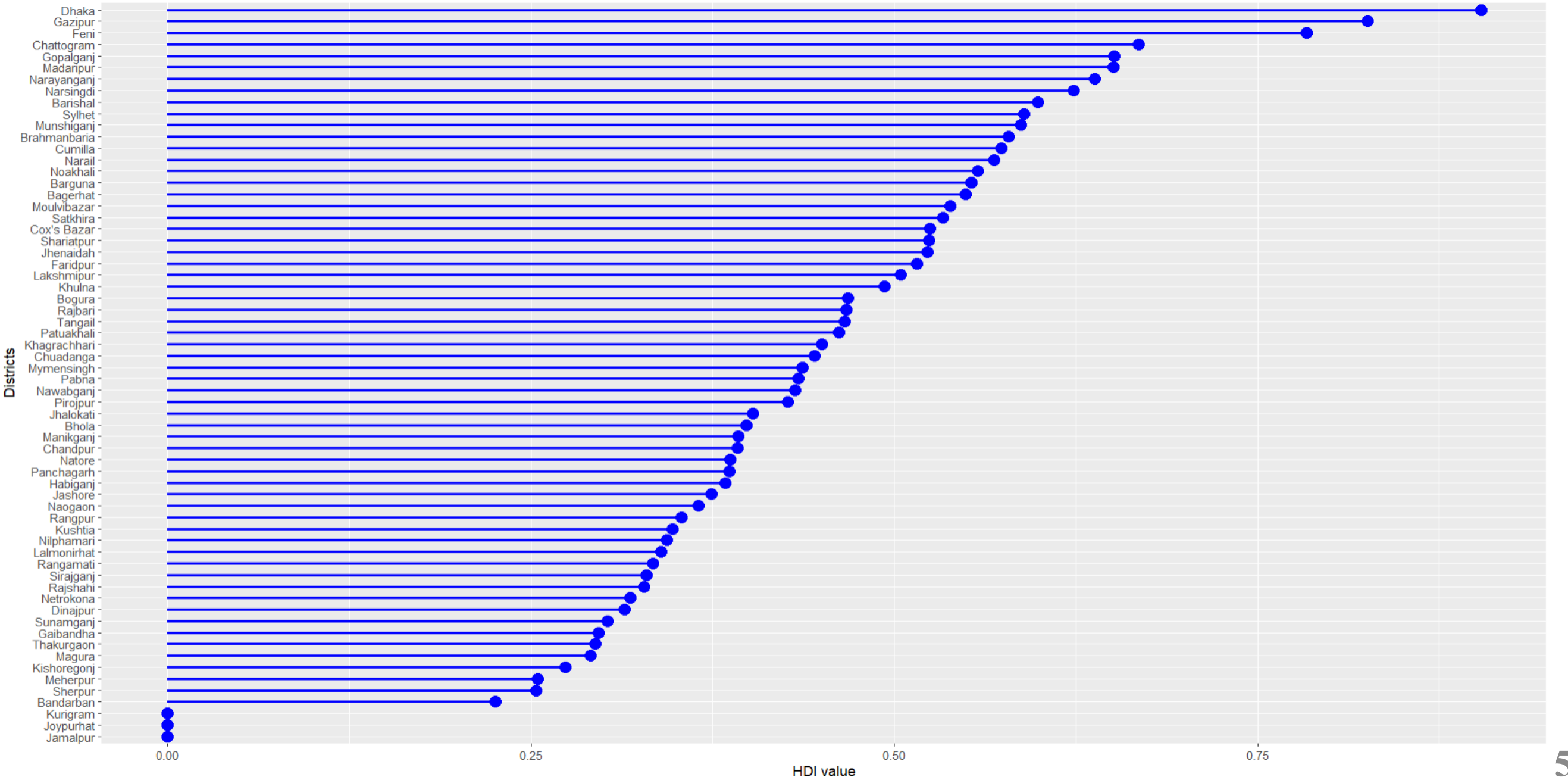$$Consumption\ Index = \frac{\log(Actual\ Valu) - \log(Minimum\ Value)}{\log(Maximum) - \log(Minimum\ Value)}$$

HDI Index: $(I_{Death\ Rate} * I_{Literacy\ Rate} * I_{Consumption})^{1/3}$

❑ **Statistics of HDI Index**

N	64
Mean	0.44
Standard Deviation	0.17
Median	0.44
Skewness	-0.14
Kurtosis	0.92
Min	0
Max	0.90

HDI Index of the Districts

Formal Regionalization

❑ **Classification Method:**

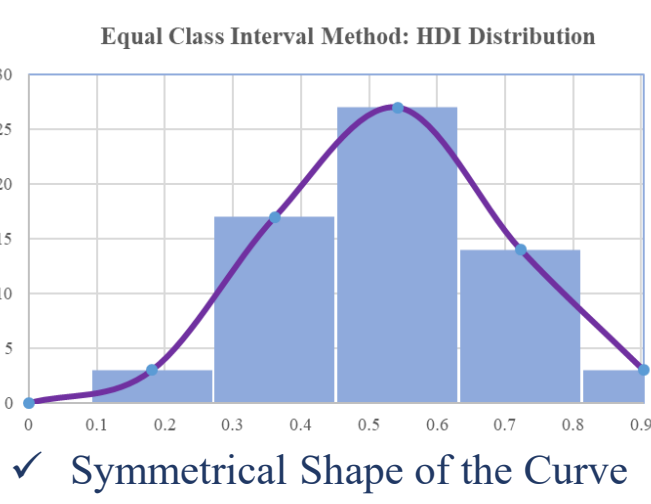| Equal Class Interval	Mean and Standard Deviation Techniques	Arithmetic Techniques	Geometric Progression Technique
$$X = \frac{B-A}{N}$$ X (Class interval) B (Largest value in data set) A (Smallest value in data set) N (Desire no of classes)	**Class Interval** (Mean - 3std) – (Mean - 2std) (Mean - 2std) – (Mean - 1std) (Mean - 1std) – Mean Mean – (Mean + 1std) (Mean + 1std) – (Mean + 2std) (Mean + 2std) – (Mean + 3std)	$$A + X + 2X + 3X + \ldots + NX = B$$ The class interval is calculated as, $[A-(A+X)], [(A+X)-(A+X+2X)]\ldots\ldots$	$$B = AX^{N}$$ $\log B = \log A + N \log X$ $$\log X = \frac{\log B - \log A}{N}$$
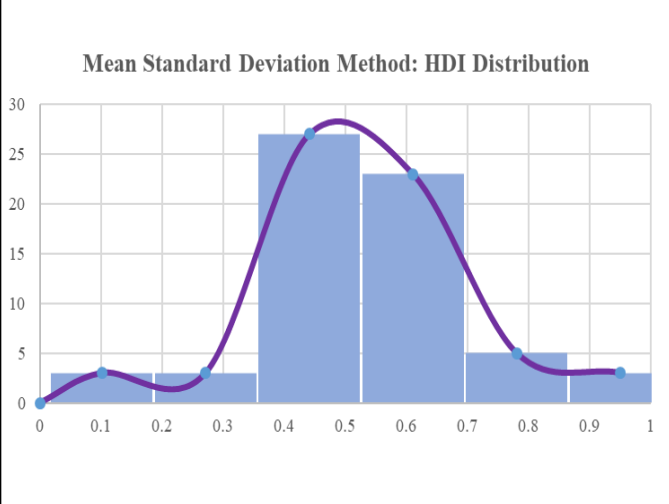
Equal Class Interval Method: HDI Distribution

Mean Standard Deviation Method: HDI Distribution

Arithmetic Mean Method: HDI Distribution

Geometric Progression Technique: HDI Distribution

✓ Symmetrical Shape of the Curve

Formal Regionalization Based on HDI index (Equal Interval Method)

Formal Regionalization Based on HDI index (Mean and Standard Deviation Techniques)

Legend
HDI
- 0.000000 - 0.180710
- 0.180711 - 0.361421
- 0.361422 - 0.542131
- 0.542132 - 0.722842
- 0.722843 - 0.903552

Legend
HDI
- 0.000000 - 0.101188
- 0.101189 - 0.271094
- 0.271095 - 0.441000
- 0.441001 - 0.610906
- 0.610907 - 0.780812
- 0.780813 - 0.950718

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Formal Region Delineation

Formal Regionalization Based on HDI index (Arithmetic Techniques)

Formal Regionalization Based on HDI index (Geometric Progression Techniques)

Legend
HDI
0.000000 - 0.060237
0.060238 - 0.180710
0.180711 - 0.361421
0.361422 - 0.602368
0.602369 - 0.903552

Legend
HDI
0.000000 - 0.266434
0.266435 - 0.361560
0.361561 - 0.490650
0.490651 - 0.665829
0.665830 - 0.903552
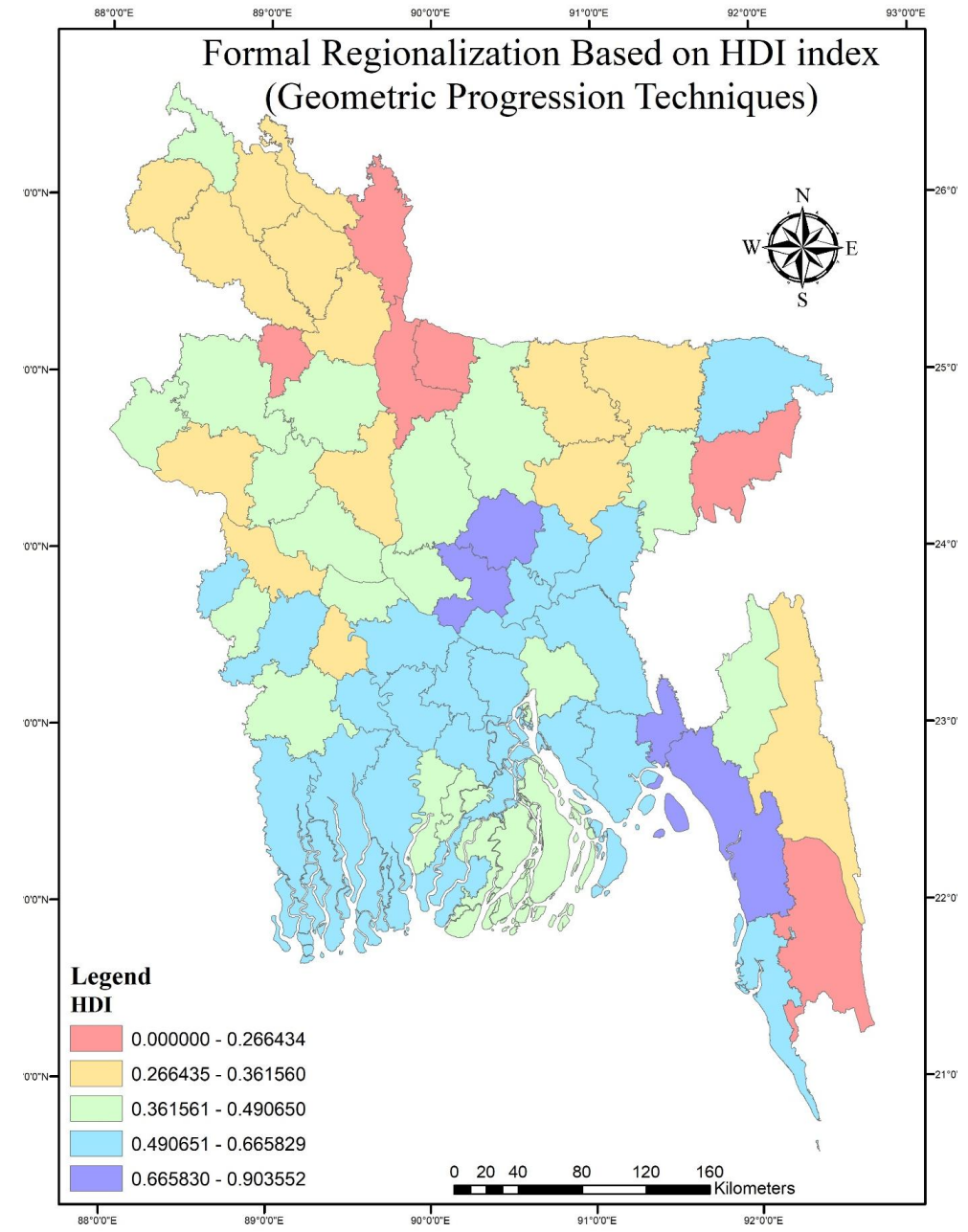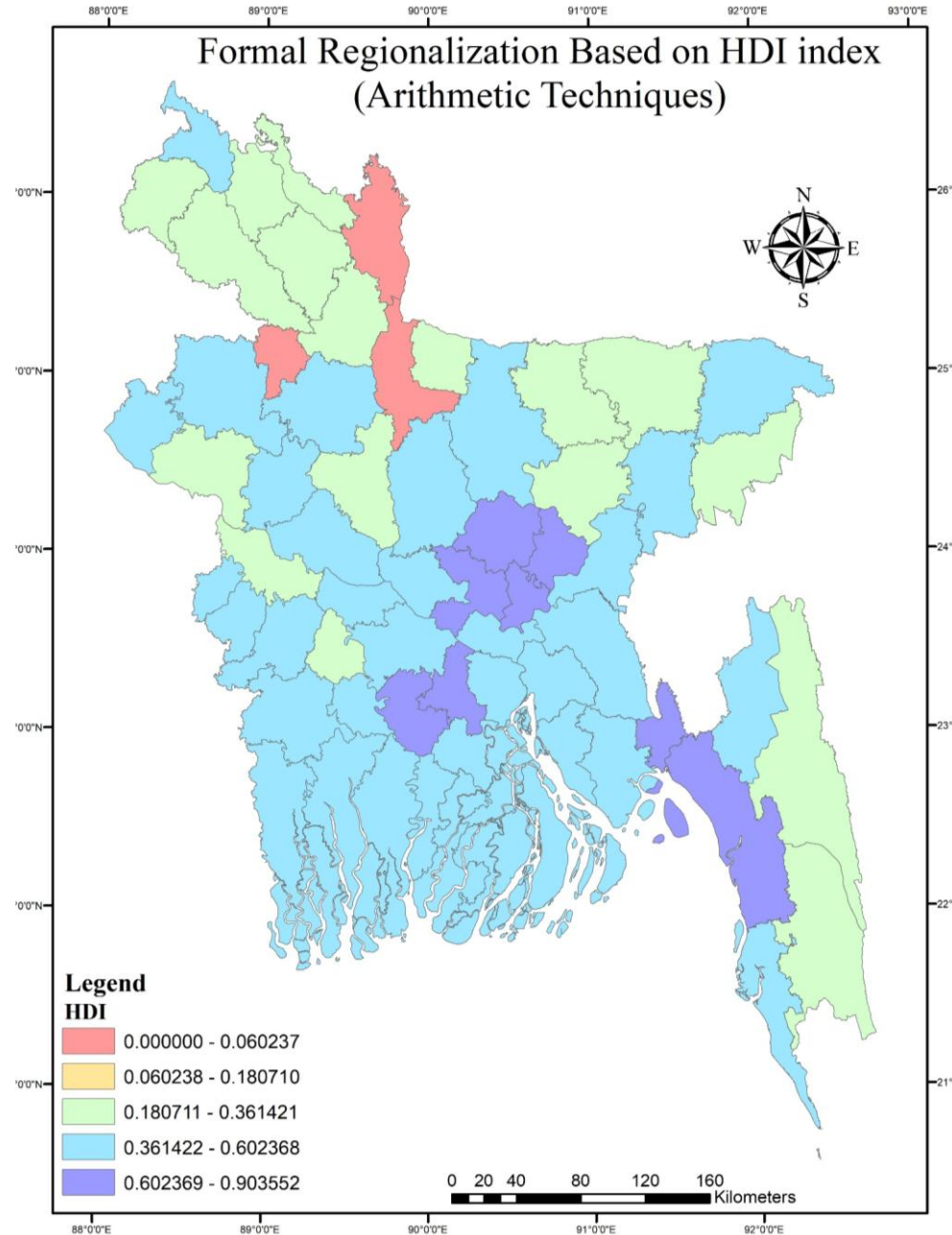
Formal Region Delineation: Equal Interval Method

Formal Regionalization Based on HDI index
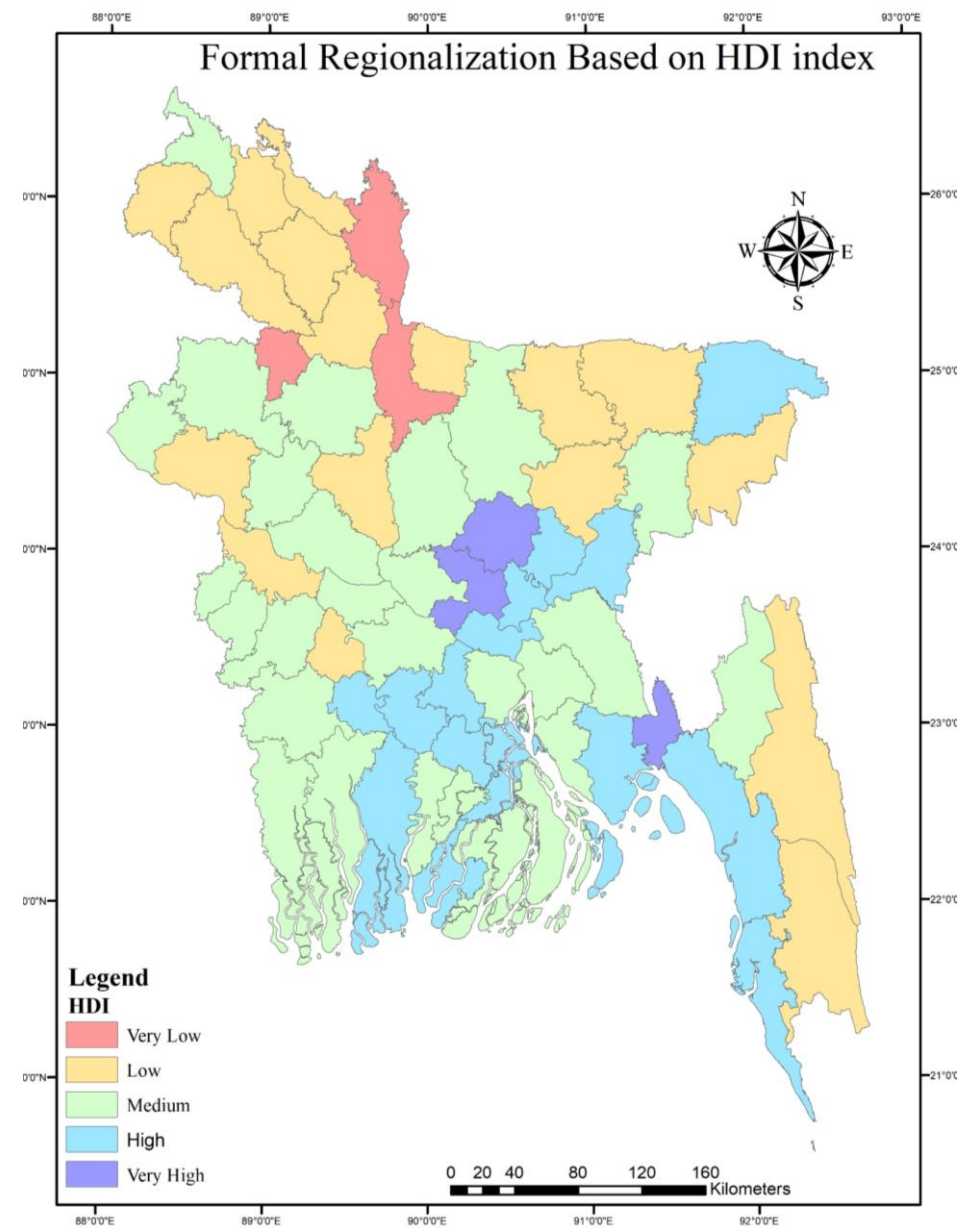
Districts	Range	Category
Jamalpur, Joypurhat, Kurigram	0.0-0.18	Very Low
Bandarban, Sherpur, Meherpur, Kishoregonj, Magura Thakurgaon, Gaibandha, Sunamganj, Dinajpur, Netrokona, Rajshahi, Sirajganj, Rangamati ,Lalmonirhat, Nilphamari, Kushtia, Rangpur	0.18-0.36	Low
Naogaon, Jashore, Habiganj, Panchagarh, Natore, Chandpur, Manikganj, Bhola, Jhalokati, Pirojpur, Nawabganj, Pabna, Mymensingh, Chuadanga, Khagrachhari, Patuakhali, Tangail, Rajbari, Bogura, Khulna, Lakshmipur, Faridpur, Jhenaidah, Shariatpur, Cox's Bazar, Satkhira, Moulvibazar	0.36-0.54	Medium
Bagerhat, Barguna, Noakhali, Narail, Cumilla, Brahmanbaria, Munshiganj, Sylhet, Barishal, Narsingdi, Narayanganj, Madaripur, Gopalganj, Chattogram	0.54-0.72	High
Feni, Gazipur, Dhaka	0.72-0.90	Very High

- More than two thirds of the urban population (69 percent) resides in the eastern part of the country where the country's capital (Dhaka) and main port city (Chittagong) are located.

- Compared with the western region, the eastern part is much better provided with certain vital urban facilities

- Major non-agricultural activities such as manufacturing, construction, transportation, health, education and other service sectors have been concentrated in cities in the eastern region

(Hayes, 2015)

Map 3: Urban populations in 2011 and growth rate 1991-2011

Note: Towns having < 25000 population are excluded here
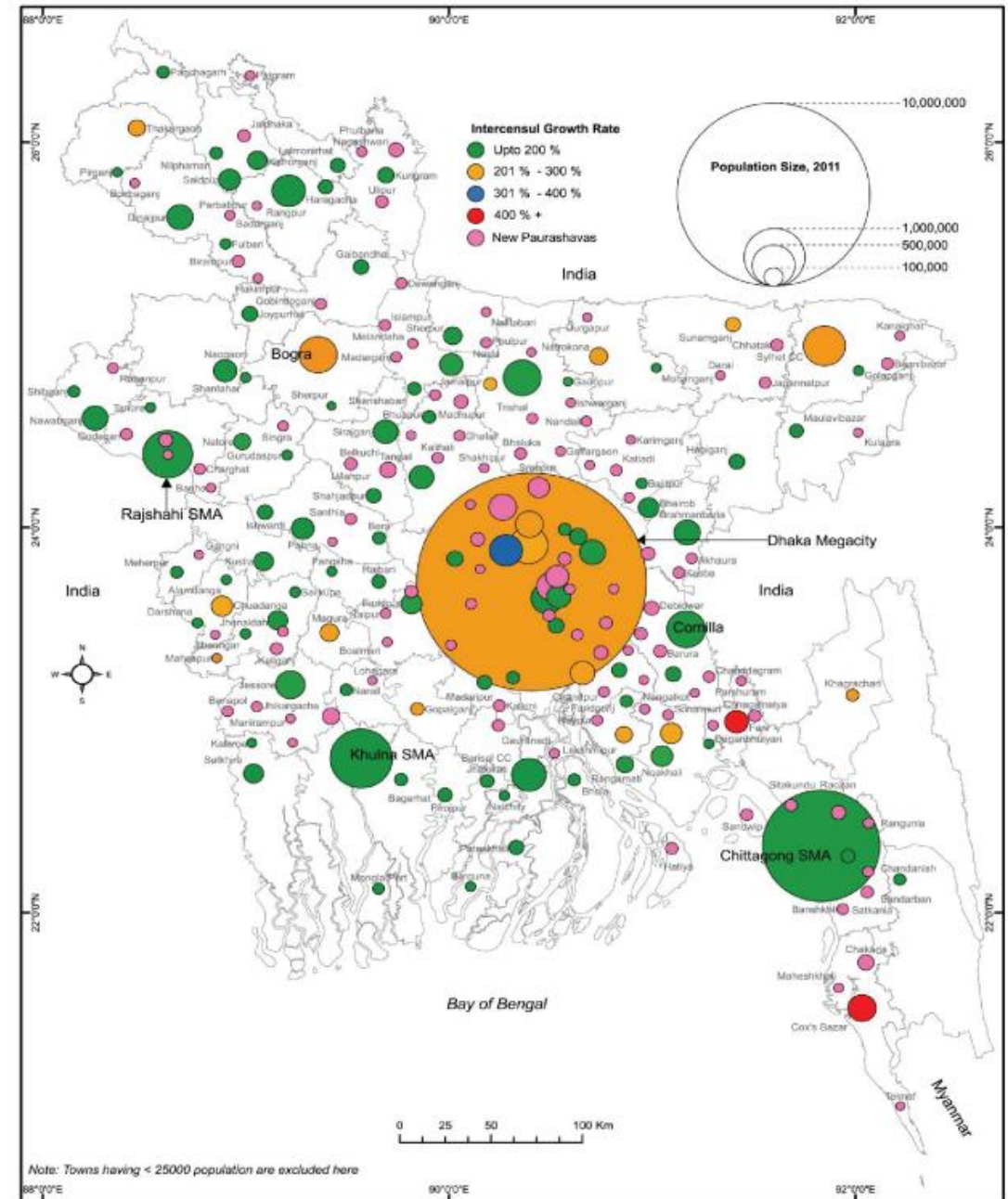
Source: Constructed by A.Q.M. Mahbub from 2011 Census data.

(Hayes, 2015)

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Division	Death Rate	Literacy Rate	Consumption	HDI	Rank
Dhaka	0.57	0.56	0.63	0.59	1
Chittagong	0.42	0.53	0.66	0.53	2
Barishal	0.40	0.72	0.44	0.50	3
Sylhet	0.38	0.42	0.64	0.46	4
Khulna	0.52	0.53	0.35	0.46	5
Rajshahi	0.39	0.44	0.35	0.39	6
Rangpur	0.42	0.39	0.25	0.34	7
Mymensingh	0.51	0.17	0.37	0.31	8

	District	HDI Index	Reason	Source
Dhaka Division (Greater Dhaka Region)	Dhaka	Very High	▪ Higher level of **urbanization (67%)** and intra-regional, **inter-regional connectivity**. ▪ Urban agglomeration and better regional connectivity lead to **growth of service infrastructure** (hospitals and educational institutions).	Hossain et al., 2021
	Gazipur	Very High		
	Narayanganj	High	▪ More than **95%** of households have **access to safe drinking water** and **85%** have good sanitation, which **lead to better health** condition and lower death rate. ▪ **Dhaka** and **Manikganj** have **higher** number of the **hospital bed per capita** ▪ **Dhaka** has **higher quantity of doctors** both in public and private hospitals.	
	Narshindi	High		
	Munshiganj	High	▪ **Dhaka** district has **higher accessibility** and intensity of educational **institutions** which led to high level of literacy rate. ▪ **Gazipur** district has **higher** number of **per capita school and college.**	
	Manikganj	Medium	In Dhaka and its surrounding districts, higher economic opportunities, contributing to poverty reduction and income growth.	Roy et al., 2021
			Non-farm activities are very much significant in Dhaka, Gazipur and Narayanganj District.	**BBS, 2011**
			In Dhaka and its adjacent areas, **exponential growth of garment industry**, textile firms lead to high economic growth, alleviated poverty, and **increased** per capita **income**.	Hussain, 2020

	District	HDI Index	Reason	Source
Chittagong Division	Chittagong	High	▪ Chittagong has become another important district for its **business facility through** its **seaport**. Fast growing trend of urbanization in this district. ▪ Location of various government and non-government offices, industrial and commercial organizations, educational institutions etc. ▪ Chittagong has **high accessibility to educational and health facility**.	Hanif et al., 2015
	Khagrachhari	Medium	▪ People are generally **deprived** of basic public services such as **health, education** and income generating support from different social service departments. ▪ The **poverty scenario** in rural CHT is about **1.6 times higher** than other parts of rural Bangladesh	Barkat et. al., 2009
	Rangamti	Low		
	Bandarban	Low	**Deficiency of physical infrastructure**, large school distance, relocation of schools are the major reasons behind low enrollment rate of children in CHT.	Popy, 2022
			▪ In the CHT, the majority of households live in poverty or extreme poverty, unemployment is high and there is a general lack of economic opportunities. ▪ Economy mostly depends on tourism and agriculture.	Jamaluddin, 2010; Rasul, 2003
	Cox's Bazar	Medium	**Lack of human resources and hospital** bed capacity leads to gaps in basic emergency care. There is **lack of educational facilities**, Rohingya refugees do not have access to education and skill development activities.	Schnabel, L. and Huang, C., 2019 (Guglielmi et al., 2020)

	District	HDI Index	Reason	Source
Chittagong Division	Feni	High	▪ **Located in a vital point** between the largest cities of the country **Dhaka and Chittagong** ▪ Well **established regional connectivity**: Dhaka-Chittagong road, one of the major roads of the country passes through Feni town ▪ Mass media, **education**, utility services and **health services** are becoming more widespread because of improving transport network. ▪ **Employment increase** in the rural non-farm sector (excluding agriculture and fisheries) grew by 33% and (informal sector, business, industry or mill and foreign remittance) by 16% between 2000 and 2010.	Akther, 2015

	District	HDI Index	Reason	Source
Sylhet Division	Sylhet	High	▪ **Remittance** is one of the biggest source behind the economic growth of Sylhet. ▪ Low literacy rate in Sunamganj because of **high poverty**, **fragile communication system**, **inadequate educational infrastructure**, **inadequate teacher.** ▪ **Sylhet** is one of the most popular tourist destinations in Bangladesh. ▪ The area around Sylhet is a traditional **tea growing area**.	Gardneand Katy, 1992 Mia M. , 2021
	Moulvibazar	Medium		
	Habiganj	Medium		
	Sunamganj	Low		

	District	HDI Index	Reason	Source
Mymensingh	Mymensingh	High	• High **flood frequency** in Jamalpur • Higher maternal mortality rate in Jamalpur due to lack of provision of safe menstrual regulation services • **Poor service of health care facilities** in Jamalpur.	Gardneand Katy, 1992 Mia M. , 2021
	Netrokona	Medium		
	Sherpur	Medium		
	Jamalpur	Low		

	District	HDI Index	Reason	Source
Barisal	Barishal	High	▪ According to BBS, Jhalokathi has the highest literacy rate. Despite of being high in literacy rate, the consumption is much lower due to natural hazard such **as flood**. ▪ The crude death rate is high due to **accessing health care facilities is a challenge** for the people living in coastal areas (Barisal, Bhola, Borguna). ▪ Seasonal Guava Production increase the economic growth of Barisal. ▪ "Kuakata" attracts a lot of tourists contributing the economy of the Barisal.	BBS, 2011; Huda et al., 2020
	Barguna	High		
	Patuakhali	Low		
	Pirojpur	Low		
	Jhalokati	Low		
	Bhola	Low		

	District	HDI Index	Reason	Source
Rangpur	Panchagarh	Medium	▪ The **per capita income** is the lowest in Kurigram, Dinajpur, Lalmonirhat, Gaibandha, Rangpur. ▪ Poor asset base and relatively **more dependence on day labour** in Kurigram, Gaibandha, Dinajpur. ▪ Relatively **high dependency ratio** and **poor human capital** base in Kurigram, Thakurgaon. ▪ Poor access to infrastructure and **SSN programmes (Social Safety Net Program)** and other services of the government in Kurigram, Gaibandha, Thakurhaon, Dinajpur. ▪ **Poor access to credit (including microcredit)** in Kurigram, Gaibandha, Thakurhaon, Dinajpur. ▪ High exposure to various **shocks** and also the increased **incidences of natural hazards** and cause huge loss of land in Kurigram, Gaibandha.	Ali and Murshid, 2019; Ali et al., 2021
	Rangpur	Low		
	Nilphamari	Low		
	Lalmonirhat	Low		
	Dinajpur	Low		
	Gaibandha	Low		
	Thakurgaon	Low		
	Kurigram	Very Low		

	District	HDI Index	Reason	Source
Khulna	Narail	High	▪ The **wage rate** of Khulna is gradually increasing. ▪ Bagerhat, a potential place for **shrimp culture** (Third largest foreign exchange commodity and contribution in GDP 9%), **betel leaf** cultivation. ▪ **Mongla port** is situated at **Bagerhat** and support variety of light and heavy industries. ▪ The number of school, college, universities are higher in Khulna than any other districts. ▪ The death rate of Khulna is lower due to the **presence of two government hospitals**, **15 private hospitals** and KDA is establishing new hospitals. ▪ lack **government funds**, **qualified doctors** and **supply of medicines** in **Kushtia,** the reason of higher death rate. ▪ Tobacco cultivation decreases the **soil fertility** of Kushtia. ▪ The RIIP project (phase -1) implemented in 2010 mobilized poor and marginalized women in Chuadanga.	BBS, 2018; Mitro et al., 2014; Roy et al., 2019 Akter et al., 2022; Sarani, 2011, BBS, 2011; Sobuj, 2022; Hossain, 2016; Ahmed and Nahiduzzaman, 2016
	Bagerhat	High		
	Satkhira	Medium		
	Jhenaidah	Medium		
	Khulna	Medium		
	Chuadanga	Medium		
	Jashore	Medium		
	Kushtia	Low		
	Magura	Low		
	Meherpur	Low		

	District	HDI Index	Reason	Source
Rajshahi	Bogura	Medium	• The **consumption of Rajshahi** is comparatively **lower** due to the economic sectors (manufacturing, wholesale and retail trade, service education and health) are not flourishing • The **educational institutions** are **concentrated** in **core areas of Rajshahi** only rather than distributed randomly. • **Nawabganj** has better **whole sale and trade due to connectivity** with borders, location of rivers.	(T. Islam et al., 2022). (M. R. Islam, 2019). (Kamruzzaman, 2014).
	Pabna	Medium		
	Nawabganj	Medium		
	Natore	Medium		
	Naogaon	Medium		
	Sirajganj	Low		
	Rajshahi	Low		
	Joypurhat	Very Low		

Recommendation

1. Decentralization of basic services and facilities from Dhaka to other regions.

2. Improve regional connectivity in Meherpur, Barisal, Patuakhali, Bhola and Pirojpur districts.

3. Investment in potential industries in the districts with lower HDI index.

4. Improve infrastructure and facilities in hill tract regions and promote tourism internationally.

5. Increase government fund for health services in northern regions (Nilphamari, Lalmonirhat, Kurigram, Thakurgaon and Joypurhat districts)

6. Undertake infrastructure improvement projects in the under developed regions to mobilize marginalized households

7. Provision of education and health facilities through different measures in Khagchari, Bandarban, Rangamati and Cox's Bazar district.

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Formal Regionalization Based on HDI index (Arithmetic Techniques)
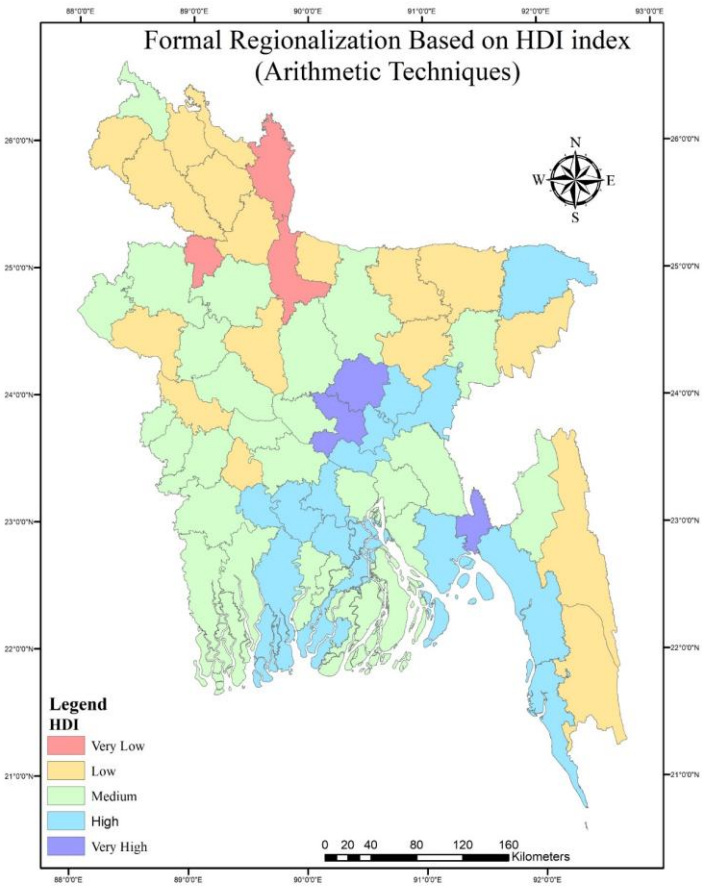
Districts	Crude Death	Rank	Literacy Rate	Rank	Consumption	Rank	HDI	Rank
Dhaka	0.823529412	12	0.969430486	1	0.923983545	1	0.903552	1
Gazipur	1	13	0.825795645	2	0.681254453	4	0.825519	2
Gopalganj	0.705882353	10	0.763400335	3	0.512809125	10	0.651349	3
Madaripur	0.735294118	11	0.557370184	6	0.672699966	6	0.650842	4
Narayanganj	0.411764706	3	0.735343384	4	0.857500059	2	0.637957	5
Narsingdi	0.529411765	7	0.551088777	7	0.830420848	3	0.623406	6
Munshiganj	0.441176471	4	0.681323283	5	0.673604414	5	0.587206	7
Shariatpur	0.588235294	8	0.471943049	8	0.517209254	9	0.523643	8
Faridpur	0.470588235	5	0.438023451	9	0.665430293	7	0.51572	9
Rajbari	0.617647059	9	0.328308208	12	0.501557304	11	0.466782	10
Tangail	0.529411765	7	0.338777219	11	0.564081028	8	0.465961	11
Manikganj	0.323529412	2	0.399916248	10	0.46715519	12	0.392447	12
	0.29411764	1		13		13		13

Formal Regionalization Based on HDI index (Arithmetic Techniques)
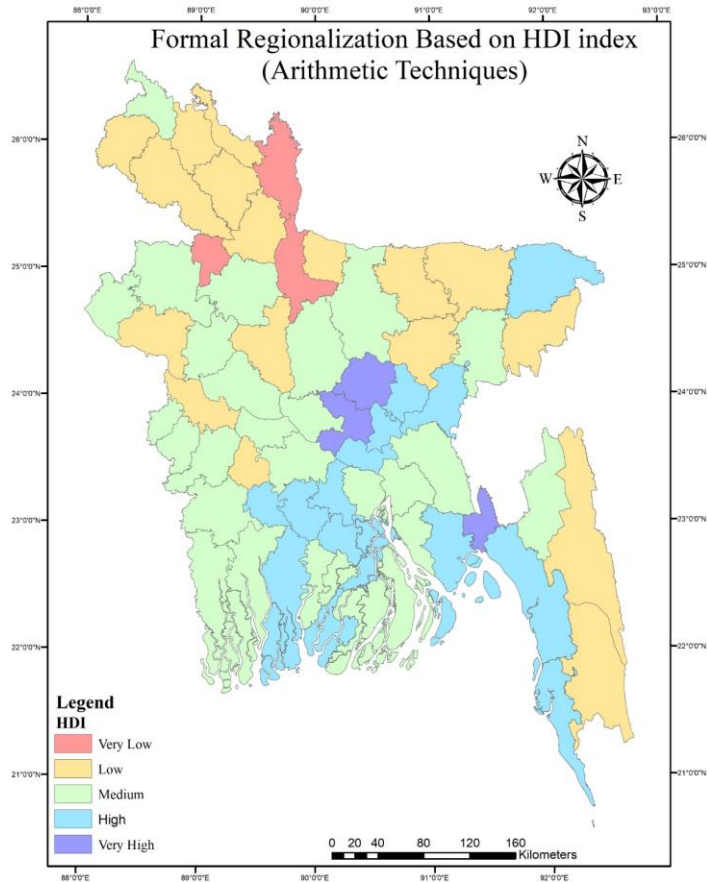
Districts	Crude Death	Rank	Literacy Rate	Rank	Consumption	Rank	HDI	Rank
Feni	0.647058824	11	0.798157454	2	0.932637329	2	0.783878	1
Chittagong	0.470588235	7	0.809045226	1	0.782453918	4	0.667868	2
Brahmanbaria	0.441176471	4	0.438860972	7	1	1	0.578513	3
Cumilla	0.441176471	4	0.627303183	4	0.681901363	6	0.573593	4
Noakhali	0.382352941	3	0.579145729	5	0.783339638	3	0.5577	5
Cox's Bazar	0.470588235	7	0.415410385	9	0.73781586	5	0.524432	6
Lakshmipur	0.5	9	0.515494137	6	0.497753593	9	0.504355	7
Khagrachhari	0.5	9	0.427135678	8	0.426743355	10	0.450022	8
Chandpur	0.147058824	1	0.691792295	3	0.592658853	7	0.392124	9
Rangamati	0.176470588	2	0.41038526	10	0.513352812	8	0.333754	10
Bandarban	0.411764706	4	0.088358459	11	0.314363259	11	0.225308	11

Formal Regionalization Based on HDI index (Arithmetic Techniques)
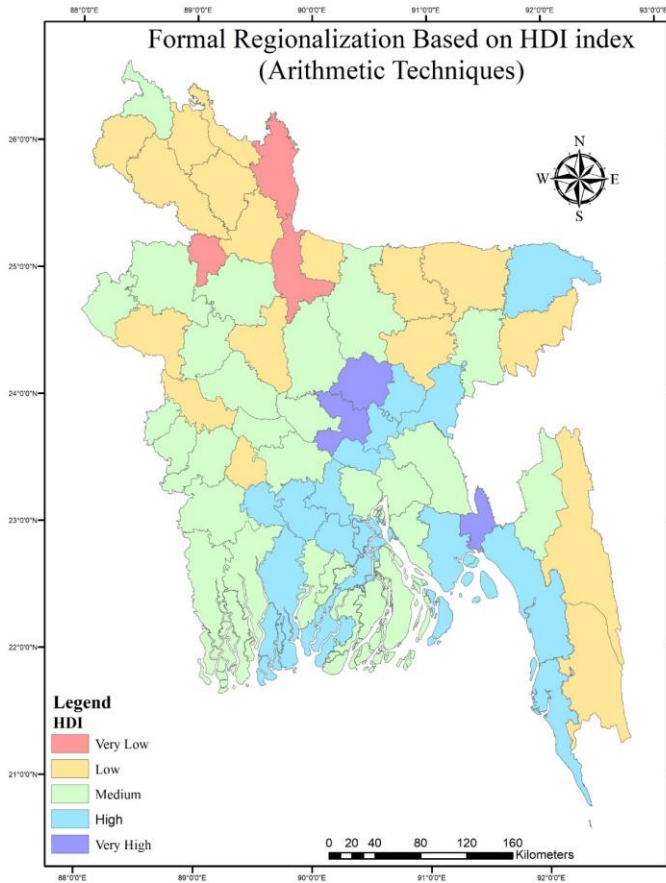
Districts	Crude Death	Rank	Literacy Rate	Rank	Consumption	Rank	HDI	Rank
Barishal	0.470588235	3	0.757537688	4	0.602252337	1	0.59879	1
Barguna	0.588235294	6	0.793969849	3	0.361864333	4	0.552883	2
Patuakhali	0.470588235	3	0.628559464	5	0.333587242	5	0.462096	3
Pirojpur	0.176470588	1	1	1	0.440511405	3	0.426786	4
Jhalokati	0.235294118	2	0.902428811	2	0.308114552	6	0.402945	5
Bhola	0.470588235	3	0.234087102	6	0.573768105	2	0.398338	6

Formal Regionalization Based on HDI index (Arithmetic Techniques)
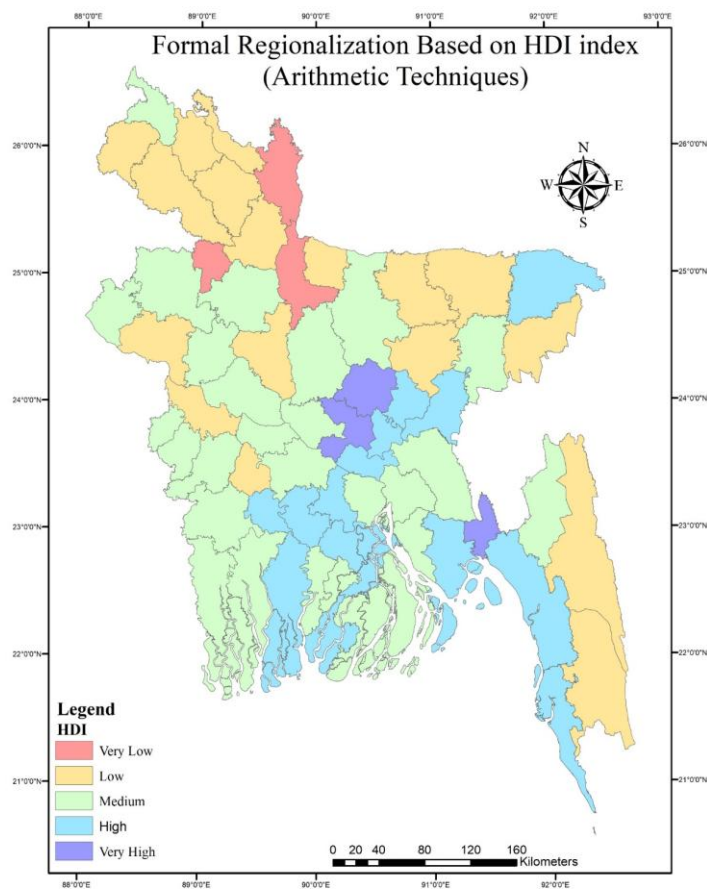
Districts	Crude Death	Rank	Literacy Rate	Rank	Consumption	Rank	HDI	Rank
Narail	0.941176471	10	0.54438861	5	0.35847885	6	0.568436	1
Bagerhat	0.529411765	5	0.828726968	1	0.37676123	5	0.548812	2
Satkhira	0.529411765	5	0.573701843	4	0.500393419	3	0.533659	3
Jhenaidah	0.588235294	7	0.467755444	6	0.518891081	1	0.522655	4
Khulna	0.382352941	3	0.796901173	2	0.394251431	4	0.493417	5
Chuadanga	0.705882353	9	0.40159129	8	0.310787181	7	0.444966	6
Jashore	0.617647059	8	0.646147404	3	0.131386964	10	0.37429	7
Kushtia	0.264705882	2	0.307788945	9	0.513292419	2	0.347105	8
Magura	0.382352941	3	0.442629816	7	0.145148809	9	0.290696	9
Meherpur	0.235294118	1	0.272613065	10	0.257573844	8	0.254695	10

Formal Regionalization Based on HDI index (Arithmetic Techniques)
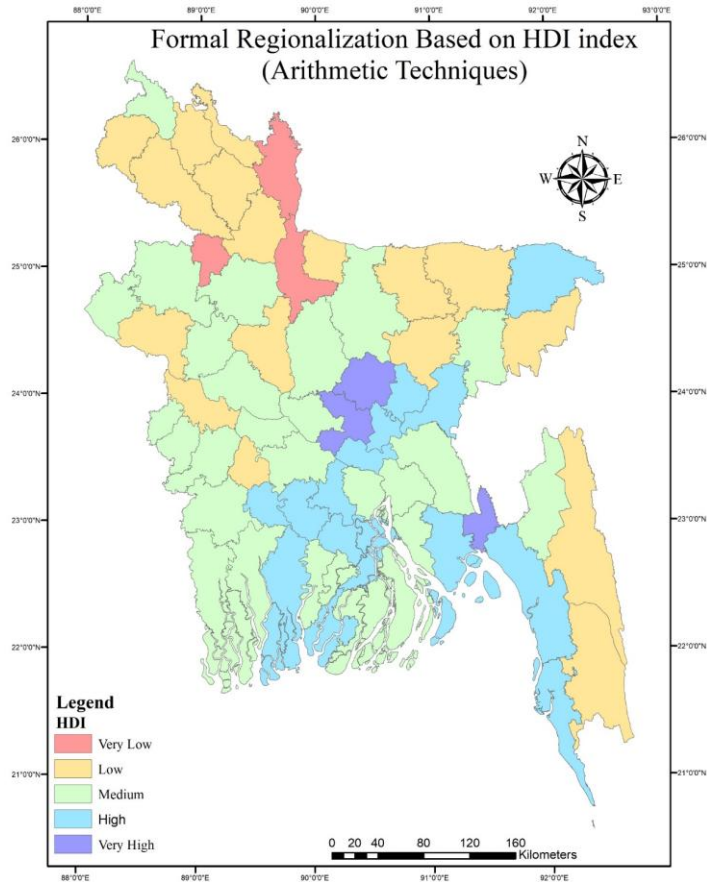
Districts	Crude Death	Rank	Literacy Rate	Rank	Consumption	Rank	HDI	Rank
Bogura	0.5	5	0.456867672	3	0.449462072	1	0.468257	1
Pabna	0.617647059	8	0.370603015	7	0.356889612	4	0.433905	2
Nawabganj	0.529411765	7	0.435092127	5	0.349483115	5	0.431784	3
Natore	0.411764706	3	0.414572864	6	0.339656075	6	0.387046	4
Naogaon	0.441176471	4	0.444304858	4	0.249020792	7	0.365463	5
Sirajganj	0.5	5	0.328308208	8	0.217428573	8	0.329248	6
Rajshahi	0.147058824	2	0.567001675	1	0.422395719	2	0.327792	7
Joypurhat	0	1	0.506700168	2	0.38848363	3	0	8

Formal Regionalization Based on HDI index (Arithmetic Techniques)
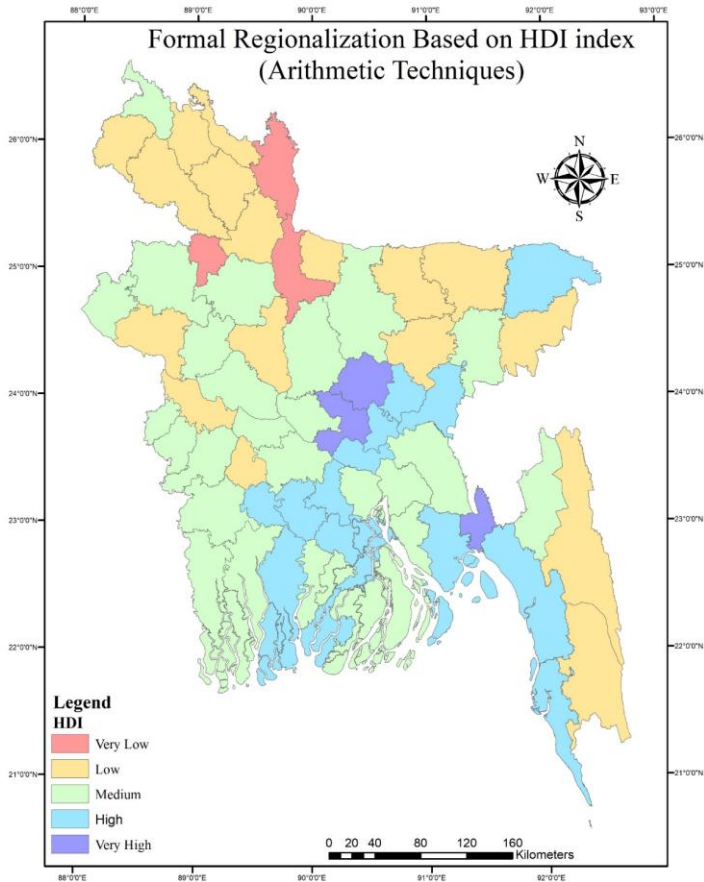
Districts	Crude Death	Rank	Literacy Rate	Rank	Consumption	Rank	HDI	Rank
Panchagarh	0.294117647	2	0.505025126	3	0.389180577	2	0.386659	1
Rangpur	0.382352941	4	0.379396985	5	0.304589407	3	0.353528	2
Nilphamari	0.5	3	0.318257956	6	0.254081338	5	0.343221	3
Lalmonirhat	0.382352941	4	0.404103853	4	0.252778209	6	0.339286	4
Dinajpur	0.558823529	7	0.607621441	1	0.091691609	7	0.314591	5
Gaibandha	0.411764706	6	0.22361809	7	0.282896701	4	0.296434	6
Thakurgaon	0.117647059	1	0.534757119	2	0.404099806	1	0.294042	7
Kurigram	0.735294118	8	0.144891122	8	0	8	0	8

Districts	Crude Death	Rank	Literacy Rate	Rank	Consumption	Rank	HDI	Rank
Sylhet	0.411764706	3	0.616834171	1	0.806186435	1	0.58941	1
Moulvibazar	0.411764706	3	0.595058626	3	0.637823567	2	0.538646	2
Habiganj	0.323529412	1	0.326214405	2	0.535650453	4	0.383795	3
Sunamganj	0.352941176	2	0.135678392	1	0.578039053	3	0.302499	4

Formal Regionalization Based on HDI index
(Arithmetic Techniques)

Legend
HDI
Very Low
Low
Medium
High
Very High

0 20 40   80   120   160
Kilometers
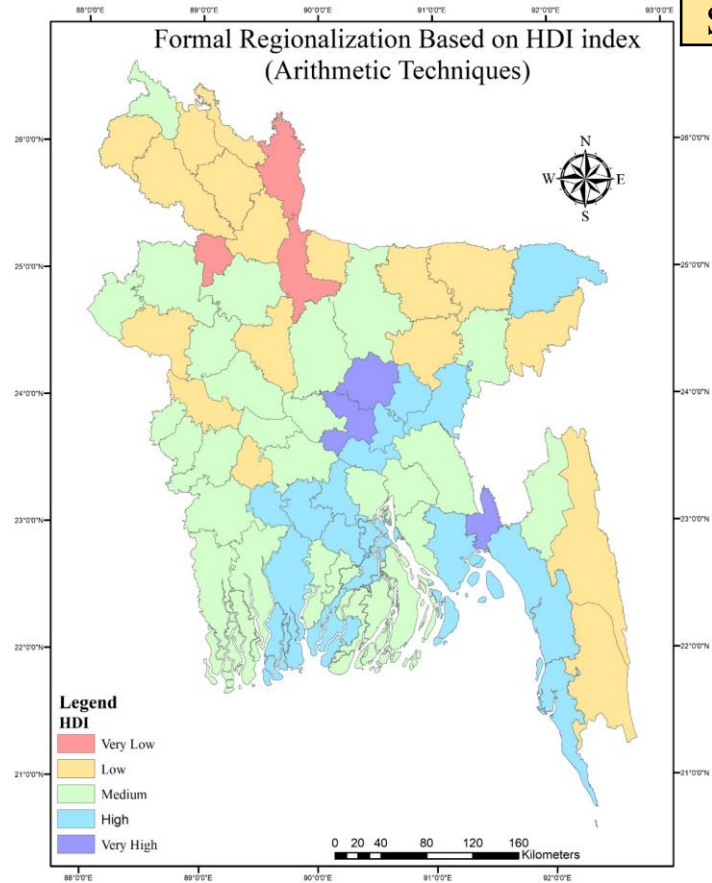
Districts	Crude Death	Rank	Literacy Rate	Rank	Consumption	Rank	HDI	Rank
Mymensingh	0.558823529	3	0.385678392	1	0.386179729	3	0.436613	1
Netrokona	0.411764706	1	0.192629816	2	0.407585337	1	0.318564	2
Sherpur	0.470588235	2	0.085427136	3	0.404168285	2	0.253279	3
Jamalpur	0.588235294	4	0	4	0.279188482	4	0	4

Formal Regionalization Based on HDI index
(Arithmetic Techniques)

Legend
HDI
Very Low
Low
Medium
High
Very High