

Non-Communicable Diseases in Bangladesh: Assessment of Potentialities of Community Clinics and Non-Communicable Disease Specialised Clinics

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Abstract

The Emerging Asian tiger Bangladesh possesses the immense potential to lead the future pathways of inclusive growth. Health is a fundamental determinant factor for productivity and growth. However, the upward trend in the cause of death due to non-communicable diseases (NCDs) poses a tremendous burden with the communicable diseases (CD) in Bangladesh. The dual burden of diseases can hinder the achievement of SDG 3, and thus it is required to address intensively to mitigate the risk factors and impact of NCDs in Bangladesh's overall economy and health scenario. Existing infrastructural facilities of community clinics (CCs) can play a catalytic role, and the establishment of NCD specialised clinics possess a substantial benefit-cost ratio in the long run. The Implementation of WHO PEN (Package of essential NCD interventions for low resource settings) through the initiative of NCD specialised clinics can play a beneficial role to provide intense treatment to the NCD patients, and the existing CCs possess the latent potential of providing elementary services of NCDs to the potential individuals with NCD risk factors. Timely initiatives can save many lives from premature deaths due to NCDs and can increase the well-being of human life to enhance productivity for sustained growth of the economy.

JEL Classification I11 · I15 · H51

Keywords Non-communicable disease · community clinics · specialised clinics

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Introduction

Non-communicable diseases (NCDs) are chronic diseases like- cardiovascular or heart diseases, different types of cancer, diabetes mellitus, hypertension, chronic respiratory or lung diseases, kidney diseases, which do not infect others. Still, the factors responsible for NCDs can be the amalgamation of genes, behaviour, ecology and physiology (WHO, 2018a). The mortality and morbidity issues associated with NCDs have been depicted as threatening challenges for human development in the 21st century. WDI (2016) revealed that more than 71 per cent of people died due to NCDs worldwide. Around 36 million people die per year due to NCDs, including 15 million premature deaths among people between 30 and 70. People of low and lower middle income countries (LMIC) that are poor and vulnerable face the excessive burden of deaths disproportionately (WHO, 2017). Furthermore, a study by Barkat reports that in Bangladesh, the NCDs are prominent causes of mortality, accounting for 50 per cent of the Years of Life Lost (YLL of DALY- Disability –Adjusted Life Years), and it will account for almost two-thirds (64 %) of all deaths in near future (Barkat, 2010). Thus, the Sustainable development goals (SDGs) number 03 emphasise the reduction of NCDs because of the devastating severity of mortality and morbidity associated with NCDs on human life.

The health sector of Bangladesh depends tremendously on the government for its policy purposes. Compared with national resource allocations, Bangladesh's health sector gets little priority in the national agendas (Barkat, 2010; Islam and Biswas, 2014). Only 4.9% of the national budget was allocated for the Ministry of Health and Family Welfare (MOHFW) in the fiscal year 2019-20, and only 0.9 per cent of Gross Domestic Product (GDP) is spent on the health sector of Bangladesh (MOF, 2020). Resource allocation for the health sector is one of the lowest in the Southeast Asia region (WHO, 2020). Out-of-pocket health expenditure (OPP) is significantly high in Bangladesh. OPP is the money directly paid by a patient while taking health service and not repaid by other institutions like insurance later. In Bangladesh, OPP was 74 % of current health expenditure in 2017 (WDI, 2020). It is exceptionally high in comparison to the global average (18 %) and some neighbouring countries (50 % in Sri Lanka, 62 % in India, and 58 % in Nepal) (WDI, 2020). Though Bangladesh's health indicators are better than many developing countries with limited resource allocations, some challenges need to address the mass population better. Lack of timely address to the NCDs can lead Bangladesh to the double disease burden of CDs and NCDs. Implementation of WHO PEN (Essential NCD interventions for low resource settings) through establishing NCD specialised clinics is imperative.

Methods

This study broadly focuses on secondary sources to portray the NCD scenario. Global, regional and country-specific data on NCDs were collected from different reports of WHO, GOB, WDI. Besides, data were also collected from various journal articles from the ResearchGate, PubMed and Google scholar. Primary data on CC visits were collected from the Upazila Health complex of a particular district of Bangladesh to see the trend and information of CC visits in rural or suburban areas. Simple statistical tools were used to determine the rates and numbers related to NCDs and data analysis.

Calculation of Benefit-Cost Ratio (BCR):

Benefit-Cost Ratio (BCR) = Total Expected Benefit (TEB) / Total Expected Cost (TEC)

Total Expected Cost (TEC) = Total Fixed Cost (TFC) + Total Variable Cost (TVC)

The cost and benefit are calculated up to 2025 only. However, the total cost will decrease over the years, as the fixed cost is only a one-time cost.

While calculating the TFC, the research study of Eberly et al. (2019) is used. For the total population of Bangladesh, on average, 385 NCD specialised clinics are required considering the capacity of the clinic to provide the integrated NCD treatment as 3 lacks potential patients who possess risk factors of NCDs. FC is considered to be spent once, and VC is calculated for five years.

While calculating the TEB, WHO (2018) assumed that around 66400 lives can be saved from premature deaths using the 'WHO Best Buys' up to 2025 in Bangladesh. It is considered that the integrated treatment provided at the NCD specialised clinics according to 'WHO Best Buys' can save the mentioned lives. The VSL (Value of Statistical Life) calculated by Viscusi and Masterman (2017) for Bangladeshi people are used to calculate the TEB.

Overall, a vigorous pilot basis procedure is required to obtain more precise observations and data on NCDs and NCD related risk behaviours in Bangladesh. Lack of budget hindrance the optimum process.

Analysis

Bangladesh was a star performer in fulfilling MDGs (Millennium Development Goals). The main credit goes to the remarkable development in reducing child mortality rate and maternal mortality rate and the immunisation program from children. Community clinics (CCs) played a significant role in that case. CCs were the brainchild of our honourable prime minister. To have pace with the third

goal of SDGs (Sustainable Development Goals), the health sector needs to be prioritised in Bangladesh's development agenda. The gradual increase in the number of elder populations and the fascination of mass people towards an urban lifestyle with the lack of proper physical education tends Bangladesh towards the dual burden of communicable diseases (CDs and non-communicable diseases (NCDs). Approximately 18500 Community Clinics and Union Healthcare Centers were installed to deliver healthcare to the people's doorstep of the periphery area (GOB, 2018). These healthcare service providers possess immense potential to address NCDs in rural and suburban areas.

The above table depicts the % change in the cause of death by non-communicable diseases (% of total) among some countries and groups as a whole.

Table 1: Global scenario of the cause of death by non-communicable diseases (% of total)

Country Name	YR 2000	YR 2010	YR 2016	% change from 2000 to 2010	% change from 2010 to 2016	% change from 2000 to 2016
Bangladesh	42.60	58.30	66.90	36.85	14.75	57.04
India	46.10	55.90	62.70	21.26	12.16	36.01
Afghanistan	28.60	39.20	44.10	37.06	12.50	54.20
Bhutan	48.80	62.90	68.60	28.89	9.06	40.57
Maldives	73.60	84.00	84.40	14.13	0.48	14.67
Pakistan	45.50	52.30	57.80	14.95	10.52	27.03
Sri Lanka	72.90	80.40	82.80	10.29	2.99	13.58
South Asia	45.65	55.65	62.35	21.90	12.05	36.59
Least developed countries: UN classification	26.82	35.04	41.95	30.68	19.70	56.42
Post-demographic dividend	87.61	88.26	88.24	0.74	-0.02	0.72
Pre-demographic dividend	22.33	27.90	32.37	24.97	16.01	44.98
OECD members	85.94	86.97	87.31	1.19	0.39	1.59
European Union	89.94	90.79	90.43	0.95	-0.40	0.55
Arab World	58.35	65.60	66.19	12.41	0.91	13.44
Upper middle income	76.20	80.66	83.28	5.86	3.24	9.29
High income	87.38	87.96	87.88	0.66	-0.09	0.56
Middle income	59.07	66.57	71.13	12.68	6.86	20.42
North America	88.14	88.43	88.30	0.32	-0.14	0.18
Low income	24.73	32.05	38.11	29.59	18.92	54.11
Low & middle income	54.63	62.50	67.50	14.40	8.00	23.56
Lower middle income	44.01	53.09	58.92	20.64	10.97	33.87
World	60.38	67.03	71.25	11.01	6.28	17.99

Source: WDI, 20230

The proportionate change from 2000 to 2010, 2010 to 2016 and 2000 to 2016 can account for the trend change over the decades. It is seen that the rate of death due to NCDs in the higher income group countries is significantly less than that in low-income countries. It is surprising that before the demographic dividend, the death rate due to NCD is excessively higher than the period after the demographic dividend. The rate of Bangladesh also resembles the same pattern. From 2000 to 2010, the death rate due to NCDs is higher than that of 2010 to 2016. To date, data is available up to 2016. The exact pen picture can be obtained after the availability of data of 2020. It is to mention that there can be an association between income and the death rate due to NCDs.

If the South Asian countries are considered, it is observed that countries like Sri Lanka, Maldives, and Bhutan significantly reduced the death rate due to NCDs from the previous decade. However, other countries like- Bangladesh, India, Pakistan and Afghanistan are lagging.

The proportionate change of death rate due to NCDs from 2000 to 2016 for Bangladesh resembles that of least developed countries: UN classification and Low-income countries. Among the South Asian countries, the proportionate change from 2010 to 2016 is higher in Bangladesh. These entire ratios culminate in the fact that one of the significant causes of death worldwide is NCDs and Bangladesh needs to address the severity of NCDs acutely.

71.25 per cent of people all over the world in 2016 due to non-communicable diseases (SDGs). In Bangladesh, 66.9 per cent and 66.35 per cent was the death rate due to NCDs in South Asia in 2016. Data reflects the catastrophe of NCDs and a part of mortality, and there is a vast population with morbidity because of NCDs. The double disease burden of communicable and non-communicable diseases requires immediate action from Bangladesh and other low and middle-income countries worldwide.

Out-of-pocket (OOP) expenditure (OOP) imposes a burden on the patient and deters many from seeking health services. Around 25 per cent of people spend more than 10 per cent of their household (HH) income or consumption on OPP. Approximately 10 per cent of people need to pay more than 25 per cent of their HH income or consumption on the OOP health expenditure in 2016. This high OPP often pushes the patient's family below the poverty line. During 2016, approximately 7 per cent population was pushed below the \$1.90 (\$ 2011 PPP) poverty line due to OOP health care expenditure.

In 2016, the total number of deaths was 856 000. Among them, 573520 died due to NCDs. According to WHO (2018a), around 66 400 lives can be saved by implementing all the WHO' Best Buys' (WHO, 2017) by 2025 in Bangladesh. The

Table 2: Comparative analysis of some variables of Bangladesh with South Asia, lower middle income and world

Variable	Bangladesh		South Asia		Lower middle income		World	
	2016	2017	2016	2017	2016	2017	2016	2017
Cause of death, by non-communicable diseases (% of total)	66.9	NA	62.35	NA	58.92	NA	71.25	NA
Current health expenditure (% of GDP)	2.31	2.27	3.45	3.46	4.12	4.05	9.98	9.88
Domestic general government health expenditure (% of GDP)	0.38	0.38	0.92	0.94	1.37	1.36	5.96	5.89
Domestic general government health expenditure (% of general government expenditure)	3.02	2.99	3.55	3.55	5.02	5.07	NA	NA
Domestic private health expenditure (% of current health expenditure)	75.77	76.55	71.73	71.16	63.04	62.87	40.03	40.25
External health expenditure (% of current health expenditure)	7.82	6.75	1.66	1.77	3.68	3.42	0.21	0.21
Increase in poverty gap at \$1.90 (\$ 2011 PPP) poverty line due to out-of-pocket health care expenditure (% of the poverty line)	2.69	NA	NA	NA	NA	NA	NA	NA
Out-of-pocket expenditure (% of current health expenditure)	73.13	73.88	63.26	62.49	55.84	55.71	18.04	18.21
The proportion of the population pushed below the \$1.90 (\$ 2011 PPP) poverty line by out-of-pocket health care expenditure (%)	6.98	NA	NA	NA	NA	NA	NA	NA
The proportion of population spending more than 10% of household consumption or income on out-of-pocket health care expenditure (%)	24.67	NA	NA	NA	NA	NA	NA	NA
The proportion of population spending more than 25% of household consumption or income on out-of-pocket health care expenditure (%)	9.53	NA	NA	NA	NA	NA	NA	NA

Source: WDI, 2020.

risk of premature death between 30-70 years was 22 per cent (Male-23 %; Female- 20 %), irrespective of gender due to NCDs.

Insufficient intake of fruit and vegetables, obesity, tobacco use, low physical activity, diabetes, hypertension, extra salt intake, a higher level of cholesterol, and

Table 3: Proportional mortality in Bangladesh in 2016

Type of disease	Proportion of death	Number of deaths
Cardiovascular diseases	30	256800
Cancers	12	102720
Chronic respiratory diseases	10	85600
Diabetes	3	25680
Other NCDs	12	102720
Communicable, maternal, perinatal and nutritional conditions	26	222560
Injuries	7	59920

Source: WHO, 2018a.

binge drinking among drinkers are identified as the risk factors for NCDs in Bangladeshi adults. A significant proportion (70.9%) has at least one risk factor, and a substantial proportion of people have two or more risk factors (GOB, 2018).

Stillmank et al. (2019) conducted a cost-benefit analysis on the free service provided at community clinics. A sample of 200 uninsured patients considered a benefit in terms of quality-adjusted life-years, and while calculating the cost, they considered the operating cost due to the free service provided in a nurse-driven

Table 4: Nine targets in Bangladesh Multi-Sectoral Action Plan for Prevention and Control of Non-communicable diseases 2018-2025

- A 25% relative reduction in risk of overall premature mortality from cardiovascular diseases, cancers, diabetes or chronic respiratory diseases
- 10% relative reduction in the harmful use of alcohol
- 30% relative reduction in the prevalence of current tobacco use in persons aged over 15 years
- 10% relative reduction in the prevalence of insufficient physical activity
- 30% relative reduction in mean population intake of salt/sodium
- 25% relative reduction in the prevalence of raised blood pressure
- Halt rise in obesity and diabetes
- 50% increase the number of eligible people receiving drug therapy and counselling (including glycaemic control) to prevent heart attacks and strokes
- 80% improve the availability of affordable basic technologies and essential medicines, including generics, required to treat major NCDs in both public and private facilities

Source: GOB, 2018

CC. Their research found that sustained cost savings for a long time and accessible service at the CCs were cost-effective.

For a developing country like Bangladesh, the existing 13785 (CBHC, 2018) community clinics possess enormous potential to provide primary care and, to some extent, secondary care of some selected diseases in Bangladesh. Now, the out of pocket expenditure for health is around 73.88 per cent (WDI, 2020). Many cannot afford to get proper treatment. The rural health facilities only provide treatment for some limited hours. In this situation, if CCs can be enriched with sufficient facilities, then huge benefits can be extracted from these. A high Benefit-cost ratio can be obtained after RCT (Randomized Control Trial Method) to provide primary care and, to some extent, possible secondary care for both CD and NCDs through CCs. For many low resource settings countries like Bangladesh, the CC model can help and bring a tremendous impact at a low cost.

The study of Hills et al. (2018) emphasised the primary prevention strategies to tackle NCDs and the combined effort on the educational system, training, and capacity development at the community level. In the low resources countries, for effective prevention and management of NCDs, there is a requirement of change in lifestyle and widespread utilisation of community health workers for mitigating the impact of some major NCDs from the early childhood level. The authors emphasise the availability of effective non-physician care at the primary level to address the NCDs for a better outcome.

Community Clinics in Bangladesh

Community Clinic (CC) is an innovative initiative to provide primary health care facilities to the doorstep of rural people all over the country. Huge people are provided with elementary health care services from the CCs, and it has become a strong pillar of providing health care in the whole health system of Bangladesh. CC has got a unique instance of public-private partnership (PPP). Since the land is given by the local people and other intracultural facilities like- medicine, construction of the infrastructure, logistic support and other required inputs are provided by the government. However, the management is done by the government and the community through a community group (CG). The community is the owner of CC and plays its role in continuous improvement. It is one of the flagship programmes of the present government. As of June 2016, there are 13785 CCs, and the number of CCs is increasing (CBHC, 2018).

Table 7: NCD scenario in Keraniganj Upazila (Source: Upazila health and family planning office, Keraniganj)

Name of disease	Total no of patients	Gender		Age group						Risky behaviour*		
		Male	Female	<25	25-34	35-44	45-54	55-64	64+	1	2	
Hypertension	56	32	24	0	3	11	14	13	15	11	32	13
Cardiovascular disease (CVD)	14	10	4	0	0	0	5	5	4	4	6	3
Stroke/												
Cerebrovascular disease (CVA)	2	2	0	0	0	0	0	1	1	1	1	0
Diabetes mellitus	17	9	8	0	0	0	4	6	7	7	7	8
Chronic obstructive pulmonary disease (COPD)	39	25	14	2	6	7	8	7	9	16	17	23
Asthma	50	30	20	1	6	8	9	11	15	14	24	17
	Total no of patients	Male	Female	<25	25-34	35-44	45-54	55-64	64+			
Hypertension	63	36	27	0	3	12	15	14	22	11	32	13
Cardiovascular disease (CVD)	16	11	5	0	0	0	5	5	6	4	6	3
Stroke/												
Cerebrovascular disease (CVA)	3	2	1	0	0	0	0	2	1	1	1	0
Diabetes mellitus	19	09	10	0	0	0	4	6	9	7	7	8
Chronic obstructive pulmonary disease (COPD)	41	27	14	3	7	8	10	7	16	16	17	23
Asthma	53	34	19	01	02	08	12	14	16	14	24	17

Continue

Name of disease	Total no of patients	Gender		Age group						Risky behaviour*		
		Male	Female	<25	35-45		55-64		64+	1	2	3
					25-34	44-54	17	29				
Hypertension	72	43	29	0	3	8	15	17	29	12	30	15
Cardiovascular disease (CVD)	11	6	5	0	0	0	1	4	6	4	6	3
Stroke/ Cerebrovascular disease (CVA)	1	1	0	0	0	0	0	1	0	0	1	0
Diabetes mellitus Chronic obstructive pulmonary disease (COPD)	22	9	13	0	0	0	5	6	11	7	7	10
Asthma	43	27	16	4	5	7	6	7	16	15	16	23
	50	32	18	1	2	7	12	13	15	13	22	17
Name of disease	Total no of patients	Gender		Age group						Risky behaviour*		
		Male	Female	<25	35-45		55-64		64+	1	2	3
					25-34	44-54	17 <th>29</th>	29				
Hypertension	75	43	32	0	3	8	15	17	29	12	30	15
Cardiovascular disease (CVD)	16	9	7	0	0	0	1	4	6	4	6	3
Stroke/ Cerebrovascular disease (CVA)	0	0	0	0	0	0	0	0	0	0	0	0
Diabetes mellitus Chronic obstructive pulmonary disease (COPD)	28	10	18	0	0	0	7	6	15	7	7	10
Asthma	45	28	17	5	6	7	6	7	16	15	16	23
	47	30	17	0	2	7	12	13	15	13	22	17

Continue

Name of disease	Total no of patients	Gender						Age group						Risky behaviour*																
		Male			Female			<25		25-34		35-44		45-54		55-64		64+												
Hypertension	77	44	33	0	3	8	15	18	30	13	31	15	0	3	8	15	18	30	13	31	15	0	3	8	15	18	30	13	31	15
Cardiovascular disease (CVD)	15	8	7	0	0	0	1	4	6	4	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stroke/ Cerebrovascular disease (CVA)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diabetes mellitus	30	11	19	0	0	0	7	7	16	7	8	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chronic obstructive pulmonary disease (COPD)	48	29	19	5	7	8	6	8	16	15	16	23	5	7	8	6	8	16	15	16	23	5	7	8	6	8	16	15	16	23
Asthma	51	32	19	0	1	8	14	15	15	13	22	17	0	1	8	14	15	15	13	22	17	0	1	8	14	15	15	13	22	17
Name of disease	Total no of patients	Male			Female			<25		25-34		35-44		45-54		55-64		Risky behaviour*												
Hypertension	70	40	30	0	3	8	13	16	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cardiovascular disease (CVD)	13	9	4	0	0	2	2	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Stroke/ Cerebrovascular disease (CVA)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Diabetes mellitus	32	12	20	0	0	0	4	4	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Chronic obstructive pulmonary disease (COPD)	51	30	21	1	3	7	13	10	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Asthma	53	35	18	1	5	7	15	12	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Source: Upazila health and family planning office, Keraniganj
 * 1- Smoking and smokeless tobacco use, 2- Excessive salt intake, 3-Insufficient physical work

Findings

Community Clinics at Keraniganj Upazila: There are 20 CCs in Keraniganj Upazila, though it was supposed to be 98. Two community clinics were visited under this study

Table 8: *Diabetes mellitus and Hypertension patients in Keraniganj during March-16 to September 2016*

Month	Number of Patients of Diabetes Mellitus	Number of Patients of Hypertension
Mar-16	17 (M:9, F: 8)	56 (M:32, F: 24)
Apr-16	19 (M:9, F: 10)	63 (M:36, F: 27)
June-16	22 (M:9, F: 13)	72 (M:43, F: 29)
July-16	28 (M:10, F: 18)	75 (M:43, F: 32)
Aug-16	32 (M:12, F: 20)	70 (M:40, F: 30)
Sept-16	30 (M:11, F: 19)	77 (M:44, F: 33)

Source: Upazila health and family planning office, Keraniganj

An increasing trend in both diseases is observed, though the number of diabetic patients seems low compared to other NCDs. However, the severity associated with diabetes is enormous. Prolonged diabetes gives rise to many other diseases like affecting other body organs like kidneys, teeth, foot, and pain in the body. Type II diabetic patients gradually experience a reduction in their productivity. The direct and indirect effects of diabetes cannot be ignored. It should be accounted for, and measures should be taken to tackle this disease.

Risky behaviours (like smoking and smokeless tobacco use, excessive salt intake, and insufficient physical work) are acute among NCDs patients. Thus, basic health education is necessary to persuade them to practice healthy behaviour (like- reducing salt intake while eating, doing physical activities, not consuming smokeless tobacco, stopping smoking).

From the data, it is evident that patients suffering from NCDs had a tendency to visit nearby CCs, and with the installation of appropriate infrastructures, primary care for NCDs can be provided to rural people's doorsteps. Since females do visit CCs more than males and female health often remains unattended in rural households. CCs can serve as an efficient catalyst to serve healthcare service to the rural people who cannot afford to go far for health service.

Thus, if NCD specialised clinics are set up all over the country, then in order to provide integrated treatment according to the WHO Best Buys (prescribed ways of providing treatment of some acute NCDs) and WHO PEN (Package of

Table 9: Determination of Benefit-Cost Ratio (BCR) of NCD specialised clinics

Variable	Value	Source
Population of Bangladesh	165.1 Million	Worldometer, 2020
Proportion of population having NCD risk factors	70 per cent	GOB, 2018
Number of population with NCD risk factors	115.6 Million	Calculation
Number of people who can get chronic care in NCD specialised clinic	3 Lacks	Eberly et al., 2019
Total number of NCD specialised clinics required to provide integrated care to the chronic NCD patients	385	Calculation
Fixed cost of set up (USD)	47967	Eberly et al., 2019
Fixed cost of setting up one NCD specialised clinic (BDT)	40 Lacks 30 Thousand	Calculation
Fixed cost of setting up 385 NCD specialised clinics (BDT)	1.55 Billion	Calculation
Variable cost per year for NCD care provision (USD)	68975	Eberly et al., 2019
Variable cost per year for NCD care provision (BDT)	57 Lacks 93 Thousand	Calculation
Total cost (FC+VC) in the first year for setting up an NCD specialised clinic (BDT)	98 Lacks 23 Thousand	Calculation
Variable cost of care provision in 5 years in one NCD specialised clinic (BDT)	2Crore 89 Lacks	Calculation
Variable cost of care provision in 5 years in 385 NCD specialised clinics (BDT)	11.15 Billion	Calculation
Total cost (FC+VC) of care provision in 5 years in 385 NCD specialised clinics (BDT)	1270 Crore or 12.7 Billion	Calculation
Implementation of WHO best Buys can save lives up to 2025	66400 lives	WHO, 2018b
Value of Statistical Life of a Bangladeshi (VSL) (USD)	205000	Viscusi and Masterman (2017)
Value of Statistical Life of a Bangladeshi (VSL) (BDT)	1 Crore 72 Lacks	Viscusi and Masterman (2017)
Total benefit from saving lives (BDT) up to 2025	1143.4 Billion	Calculation
Expected Total cost (TC=FC+VC) of integrated NCD care provision in 5 years in 385 NCD specialised clinics (BDT)	12.7 Billion	Calculation
Expected Total benefit (TB)from lives saved (BDT) up to 2025	1143.4 Billion	Calculation
Expected Benefit-Cost Ratio (BCR) of integrated treatment in NCD specialised clinics	90	Calculation

Source: Authors' calculation

essential NCD interventions for low resource settings) to the patients with NCDs risk factors then for first five years the benefit will be 90 times higher than the cost. If taka one is spent for this purpose, the taka 90 will be obtained in terms of benefit. In the first year, setting up only one clinic and providing treatment will incur a cost of Tk. 98 lacks 23,000. For five years, the TC is Tk. 12.7 Billion, and the expected benefit from saving lives up to 2025 will be approximately Tk. 1143.4 Billion. Thus the Expected Benefit-Cost Ratio (BCR) of integrated treatment in NCD specialised clinics is determined as 90 for five years.

Though there are other benefits in terms of DALY (Disability-adjusted years) and QALY (Quality Adjusted Life Years) and the increase in productivity and well-being of the patients of NCDs, which are not calculated here, only the direct expected benefit from lives saved are calculated in this study. Thus, in the long run, the benefit will be increasing, and the cost will be decreasing, as the fixed cost curve will be asymptotically downward sloping. Eventually, the variable cost will be the total cost of providing NCD treatment in the long run.

Sensitivity Analysis: The Sensitivity Analysis shows that if the cost increases by 10 per cent, 50 per cent, or even 100 per cent, then there will also be a positive outcome. The BCR will still be positive. Thus, the BCR will be 81, 60 and 45, respectively.

Table 10: Sensitivity Analysis

Scenario	Baseline case	Scenario 1	Scenario 2	Scenario 3
1 10% higher cost		10% higher cost		
2 50% higher cost			50% higher cost	
3 100% higher cost				100% higher cost
Benefit: Cost ratio	90	81	60	45

Source: Authors' calculation

Case study

Most of the CC visitors were female. To have a general idea, transcription of the CC visitors was undertaken seriously. Since many of them have the symptoms of NCDs were not aware of the diseases and the severity in the long run. They even did not know about the notion of physical education regarding the benefit of taking no extra salt, the drawback of physical inactivity, demerits of smokeless tobacco and the importance of fruits and vegetable intake. One of the transcriptions of a female is worth mentioning who introduced herself as 'Buchir Ma.' Buchi is her elder daughter, and she introduced herself as so. Then after asking about her name, she replied shyly that her name was Zohra Begum. Her weight was 78 Kg. She has obesity problems.

Investigator: Why are you here?

Zohra: I came here to take some medicine, and if possible, I would like to measure my pressure with the Apa's machine (she was telling me about the BP check-up with the pressure machine of CHCP or Community Health Care Provider).

Investigator: What is your problem?

Zohra: Nothing serious. I could not do my household chores because of my drowsiness. Along with this, I have pain in my leg joints and the lower part of my leg.

Investigator: What type of medicine do you want?

Zohra: I want some pain killer.

Investigator: How often are you having these problems?

Zohra: It is now a common phenomenon. As nowadays, I cannot even use my hands properly for my household chores. I think the medicines are also not working.

Investigator: How frequently do you visit CC?

Zohra: Minimum twice a month, especially during the early of every month. The medicine was more available at that time.

Investigator: Why do you want to check your blood pressure?

Zohra: Once in my visit, CHCP Apa checked my BP and told me to take less extra salt in my food.

Investigator: Did you listen to her?

Zohra: I cannot take my food without extra salt.

Investigator: Have you ever heard about hypertension or diabetes?

Zohra: I know about fever, cold, cough, and diarrhoea. However, I am not familiar with what you said. Whenever I have these problems, I come to CC and take medicine from CHCP Apa and become healthy. However, I do not know why; I feel no interest in my work and pain in my body, and surprisingly, the painkiller is not working.

Investigator: Have you ever checked your sugar level?

Zohra: Sugar level?

Investigator: Let us help you to check your sugar level.

Zohra: I have no extra money to pay you. I came to CC for complementary medicine.

Investigator: We will check your sugar level free of cost.

Zohra: Will I have any harm because of this?

Investigator: No. Just one drop of your blood will tell us about the sugar level within a minute.

Zohra: Please do fast. I have to go.

Investigator: Okay. Have you taken your breakfast before coming?

Zohra: Yes.

Investigator: Your blood sugar level is 16.3, and it is very high!

Zohra: What does it mean, and what to do now?

Investigator: You have to consult a physician first, take medicine as per the prescription, and maintain a balanced life.

Zohra: My husband sometimes visits private practitioners, but I never go outside my area.

Investigator: You have to take a step now, and you may go to the Upazila health complex at most negligible.

Zohra: I do not find any time in the whole day for myself.

Investigator: How often do you take fruits?

Zohra: Once or twice a month.

Investigator: Your body may lack proper vitamins and minerals. You may have had diabetes for a long time, and that is why you are feeling drowsiness. As your BP is high (140/90), this high BP with prolonged diabetes can cause heart disease and many other problems. You may need to go for diagnosing as per the advice of the physician.

Zohra: What are you saying, Madam? I came here to take some medicine, and I think I will be okay as I used to be. I will rest to tackle my drowsiness—

no need to go far to consult a doctor. The village women do so much work all day. No severe disease will take place with us.

Investigator: We, the female, never think of our health, and it is high time to change our views for the sake of our own health and our beloved family. CHCP will guide you further.

Zohra: Okay, I will talk to my husband and tell him to take me to the physician he used to go to for his health problems.

Investigator: Okay. Take care of your health, visit the doctor as soon as possible, and maintain the prescription and doctor's advice very seriously.

Zohra: Oaky Apa.

Policy recommendations

1. Implementation of WHO PEN (Package of essential NCD interventions for low resource settings) through the initiative of NCD specialised clinics. Initially, a pilot study can be done.
2. Vigorous mass awareness programs can increase the mortality and morbidity associated with NCDs among people.
3. Since people tend to visit CCs not only for regular services provided but also for NCDs, the role of CCs can be rethought in this regard.
4. Community health workers need to be well trained and well equipped to identify, check, and provide NCDs' elementary care to the patients.
5. If effective elementary health care can be provided to patients with NCDs, many lives can be saved upon required referral.
6. Regular basis meetings of community health workers with nearby inhabitants can increase the knowledge of physical education and a balanced lifestyle.
7. Visitors of CCs need to be briefed on the adverse impact of extra salt intake, smoking and smokeless tobacco consumption, physical inactivity, low fruits/vegetables intake regularly.
8. In-depth awareness-building program can be taken using mass media and social media regarding the nine targets in Bangladesh Multi-Sectoral Action Plan for Prevention and Control of Non-communicable diseases 2018-2025
9. Since the CCs possess the enormous latent potential to provide elementary services of NCDs. Thus acute attention should be given to the existing CCs to unlock their potentialities.

10. More investment from the government and other sources is needed for the infrastructural development in CCs for the proper provision of elementary healthcare facilities to the visitors. CCs can play a vital role in understanding the potential NCD patients to lead a healthy life and providing elementary healthcare services for fruitful management of NCDs at the root level.

Conclusion

NCDs are global threats to the well-being of human beings. NCDs can be termed as silent killers as they silently diminish the productivity and immunity of the patients. The primary cause of global deaths is NCDs. Bangladesh is not an exception. In order to fulfil SDG number 3 to a large extent, NCDs need to be tackled. The state-level effort has been taken, but there is more scope for improved management and prevention of NCDs. The WHO prescribed PEN (Package of essential NCD interventions for low resource settings) can act as a catalytic role in this regard. NCD specialised clinics can assist Bangladesh's health sector to a great extent. Above all, the existing infrastructures of CCs can work as a pillar to provide the elementary services for NCDs and then proper referral to the higher healthcare facilities can save many lives. The role of the community is being emphasised while addressing the risk factors of NCDs, and the CCs of Bangladesh can bring fruitful improvement in the prevention and management strategies of NCDs. At the same time, the NCD specialised clinic possesses a substantial benefit-cost ratio (BCR) even with the increase in the cost of 100 per cent. Therefore, initially, a pilot study can assist in determining the impact of NCD specialised clinics to pursue the feasibility of massive projects in the long run due to financial constraints.

References

- Barkat, A. (2010). Political Economy of Health Care in Bangladesh. *Social Science Review, The Dhaka University Studies, Part-D, Volume 27, Number 1, June 2010*.
- Community-Based Health Care (CBHC). (2018). Retrieved from: <http://www.communityclinic.gov.bd/>
- Eberly, L. A., Rusangwa, C., Neal, C. C., Mukundiukuri, J. P., Mpanusingo, E., Mungunga, J. C., ... & Kwan, G. (2019). Cost of integrated chronic care for severe non-communicable diseases at district hospitals in rural Rwanda. *BMJ global health, 4(3)*, e001449. Retrieved from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6597643/>
- Government of Bangladesh (GOB). (2018). Multi-sectoral action plan for prevention and control of non-communicable diseases 2018-2025. Dhaka: Non-communicable Disease Control Programme, Directorate General of Health Services. Retrieved from: https://hsd.gov.bd/sites/default/files/files/hsd.portal.gov.bd/notices/11c6c409_7867_4fdc_9ae6_b27c64a76714/MSAP%20english.pdf
- Hills, A. P., Misra, A., Gill, J. M., Byrne, N. M., Soares, M. J., Ramachandran, A., ... & Arena, R. (2018). Public health and health systems: implications for the prevention and management of type 2 diabetes in south Asia. *The Lancet Diabetes & Endocrinology, 6(12)*, 992-1002. Retrieved from: <https://www.sciencedirect.com/science/article/abs/pii/S2213858718302031>
- Islam, A., & Biswas, T. (2014). Health system in Bangladesh: Challenges and opportunities. *American Journal of Health Research, 2(6)*, pp.366-374. Retrieved from: https://www.researchgate.net/profile/Tuhin_Biswas2/publication/276105127_Health_System_in_Bangladesh_Challenges_and_Opportunities/link/s/559fa7b208ae0e0bf6124b88.pdf
- Ministry of Finance (MOF). (2020). Government of the People's Republic of Bangladesh. Accessed on Jun 27 2020. Retrieved from: https://mof.gov.bd/site/view/budget_mof/%E0%A7%A8%E0%A7%A6%E0%A7%A8%E0%A7%A6-%E0%A7%A8%E0%A7%A7/%E0%A6%AC%E0%A6%BE%E0%A6%9C%E0%A7%87%E0%A6%9F%E0%A7%87%E0%A6%B0%20%E0%A6%B8%E0%A6%82%E0%A6%95%E0%A7%8D%E0%A6%B7%E0%A6%BF%E0%A6%AA%E0%A7%8D%E0%A6%A4%E0%A6%B8%E0%A6%BE%E0%A6%B0/Budget-in-Brief
- Stillmank, E., Bloesl, K., McArthur, E., Artz, B., & Lancaster, R. J. (2019). A Cost-Benefit Analysis of a Community Free Clinic. *Journal of Community Health Nursing,*

- 36(2), 91-101. Retrieved from: <https://www.tandfonline.com/doi/abs/10.1080/07370016.2019.1583838>
- Viscusi, W. K., & Masterman, C. J. (2017). Income elasticities and global values of a statistical life. *Journal of Benefit-Cost Analysis*, 8(2), 226-250. Retrieved from: https://static1.squarespace.com/static/5be33b0efcf7fdd77c7823be/t/5be9f18e4fa51a2b58ab98e7/1542058383005/355_Income_Elasticities_and_Global_VSL.pdf
- WDI (World Development Indicators). (2020). Retrieved from: <https://databank.worldbank.org/source/world-development-indicators#>
- World Health Organization (WHO). 2020. Bangladesh National Health Accounts, an overview on the public and private expenditures in the health sector. Retrieved from: <http://origin.searo.who.int/bangladesh/bnha/en/>
- WHO (World Health Organization). (2018a). Non-communicable diseases (NCD) Country Profiles of Bangladesh. Retrieved from: https://www.who.int/nmh/countries/bgd_en.pdf?ua=1
- World Health Organization (WHO). (2018b). National STEPS survey for non-communicable diseases risk factors in Bangladesh 2018. Retrieved from: <https://apps.who.int/iris/bitstream/handle/10665/332886/STEPS-BAN-eng.pdf>
- World Health Organization (WHO). (2017). Tackling NCDs: 'best buys' and other recommended interventions to prevent and control non-communicable diseases (No. WHO/NMH/NVI/17.9). World Health Organization. Retrieved from: <https://apps.who.int/iris/bitstream/handle/10665/259232/WHO-NMH-NVI-17.9-eng.pdf>
- Worldometer. 2020. Bangladesh population. Retrieved from: <https://www.worldometers.info/world-population/bangladesh-population/>