How far are we from attaining target 4c of SDGs in Bangladesh? A situation analysis

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ABSTRACT: *Goal 4 of Sustainable Development Goal (SDG) is about inclusive and equitable quality education to accomplish by 2030. Among ten targets of goal 4, target 4.c is to ensure a substantial supply of qualified and trained teachers. Signatory nations agreed to provide adequate teacher training through local initiative and international cooperation. National progress of the target achievements is monitored by pre-specified indicators. This study analyzes the five accepted global indicator values of five consecutive years from 2013 to 2017 in Bangladesh. It also critically examines the national priority targets set to accomplish step-by-step at the end of three 5-year national plans by 2020, 2025 and 2030. Setting achievable and competitive targets to ultimately attain the SDG goals is crucial. This exploratory research inspects secondary data from dependable sources. Cubic spline interpolation is used for filling up the missing values in the series to draw the findings for a meaningful interpretation. A set of recommendations is made on discussions for the national policy makers and stakeholders pertaining to the revision process of the National Priority Targets at the end of first 5-year phase from 2016 to 2020.*

1. Introduction

Sustainable Development Goals (SDG) came into effect with 17 goals and a total of 169 integrated indivisible targets from 1st January 2016 for transforming our world. The SDG agenda is a plan of action for the people on the planet along with their prosperity and universal peace in larger freedom (United Nations, 2015(1)). All stakeholders in all the countries are expected to be acting in a collaborative partnership to implement this plan. The agenda requires local initiatives and global partnerships for achieving the targets by 2030 when the world will be free from poverty, hunger, disease and want, where all life will be able to thrive. Goal 4 is specifically entitled with Education in broad heading, which sets the goal of ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all. Under this goal 4, seven targets from 4.1 through 4.7 are to reach by 2030 based on educational issues including gender parity, expected learning outcome, early childhood development, affordable quality education at every level, technical and vocation skills for employment and availing decent jobs, equal opportunities for vulnerable, disable and indigenous children, and promotion of peace and non-violence for sustainable development. The other three targets, numbered as 4.a, 4.b and 4.c, are supportive and complementary to the achievement of the equitable quality education for all. This paper particularly analyses target 4.c, which is directly connected with the quality of education.

Bangladesh successfully achieved the second target of the Millennium Development Goal (MDG), which was tagged with the campaign 'Education for All'. The net student enrolment in Bangladesh primary schools reached 91 percent in 2015, up from that of 83 percent achieved in 2000 (United Nations, 2015(2)). The education target of MDG was fulfilled in Bangladesh. Upon quantity reach in education target of MDG, additional challenges are at the pave to meet the SDG 4 targets for equitable and inclusive quality education. Quality in education comes through the technological advancement and proper utilization of Information and Communication Technology (ICT) that are utilized in the effective teaching-learning processes. These challenges are expected to be handled by the classroom teachers through their expertise on using technology and the effective plans for technology integration (Tripathi, 2002). Teachers have the most important role to ensure the quality in education. They are not only the implementer of curriculum rather the source of the holistic development of students. Teaching quality is not a built-in expertise that the teachers may attain from subject study. Rather, teachers learn how to teach in professional life. Two major ways how teachers learn includes 1) from their experiences as they teach (Dewey, 1963) and 2) interactions with other teachers (Feiman-Nemser & Parker, 1993). Teaching knowledge of teachers comes from their daily contact with students, the institutions where they work, their practical experience with curricula, syllabi, teaching resources, and evaluating and grading students' performance. However, such learning is facilitated by training. After starting the profession by completing higher degree courses, teachers need to learn more through in-service training or further study as such as becoming a parent (Bransford et al., 2000). The necessity of teacher training is recognized besides the required qualifications for the practicing teachers. Developed countries have various programs to address the issue. For example, the Education and Training 2010 Work Programme of the European Commission emphasized teacher training among eight learning clusters in recognition of learning outcomes (Andersen, 2008) for quality in education. At the same time, the latest National Education Policy 2010 of Bangladesh also emphasized teachers' qualifications and teacher training. It is essential to recruit qualified teachers on one hand, and on the other, repetitive demand-driven training is imperative to develop the professional excellence of the teachers to

ensure quality education (Ministry of Education, 2010).

In the last target of the goal 4 of SDG, numbered as 4.c, it is written as one of the education agenda (United Nations, 2015(1)) –

> "By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing States."

Teacher training is essential for meeting the goal 4 of SDG. In general, teaching is a complex activity and teachers need to get formal training on teaching learning pedagogies. Moreover, teaching is highly contextualized and narrowed down to students' requirements of learning that the teachers need to continuously adapt themselves to the learning environment (Ambrose et. al., 2010). The Teaching Quality Improvement-II (TQI-II) in Secondary Education Project of the Directorate of Secondary Education under the Ministry of Education in Bangladesh was completed in 2018 as its second five-year plan since 2012 (Asian Development Bank, 2020). According to the completion report, 45,273 teachers completed continuous professional development (CPD) training and 90% of the eligible secondary teachers completed in-service bachelor of education (B.Ed) degree under this TQI II project. For research activities in higher education, University Grants Commission (UGC) of Bangladesh declared the budgetary allocation of BDT 36.8 million in 2018, which is increased by 234% in a decade from that in 2009 (UGC, 2018). In public universities, Institutional Quality Assurance Cell (IQAC) activities have been regularized under the yearly revenue budget. For continuous professional development of university teachers, Centre of Excellence in Teaching and Learning (CETL) was established in six public universities at its initial phase under the partnership with British Council (UGC, 2018). The above-mentioned initiatives are some of the governmental activities taken into action for

achieving mostly the target of the MDG and continued to the SDG phase to reach the target of 4.c by ensuring quality in education.

During the MDG period a substantial amount of foreign aid transferred to least developed countries from the developed ones most of which contributed to quantity reach of education rather than improving quality in education (Riddell, 2012; Birchler & Michaelowa, 2013). A global study in the MDG period suggested that the aid in education had significant impact on national economic growth with variations in low-income and middle-income countries (Asiedu & Nandwa, 2007). Such foreign aids include teachers' professional development training and higher education under scholarship. There are many different forms of scholarships, including distance learning, which should be available directly to the students instead of previous practice through national governments (Balfour, 2016). Besides the local initiatives for improving teachers' professional quality, opportunities for international training are also suggested in the goal 4.c particularly for the least developed countries. The world is changing with economic parameters. With the newly upgraded status of developing country, Bangladesh may start to face shrunk scopes of foreign training of teachers in near future. This paper analyzes the indicators relevant to the teachers' qualification and teachers' training situations in Bangladesh during the progress of SDG.

The objective of this study is to make a summary of the current situation of the target 4.c attainments of SDG 4 in Bangladesh. Influencing factors such as the existing pupil-teacher ratio and the tertiary education status of 25+-year-old population are considered in this study. Finally, a set of recommendations is derived from the discussions on the findings of indicators and relevant influencing factors.

2. Materials and Method

This is an exploratory study that was designed to explore the then attainment

Table 1: List of indicators for the target 4.c of SDG 4		
Indicator	**Description**	**Remark**
4.c.1	Proportion of teachers who have received at least the minimum organized teacher training	Different types of trainings designed for teachers; proportion is measured to the total number of teachers
4.c.2	Pupil-trained teacher ratio by educational level	Trained teachers have got above mentioned training
4.c.3	Percentage of teachers qualified according to national standards by education level and type of institution	Qualified teachers have got required academic qualification for teaching
4.c.4	Pupil-qualified teacher ratio by educational level	Non-qualified teachers in practice are not included in this ratio
4.c.5	Teacher attrition rate by education level	Attrition rate expresses how many teachers change their profession

situation of the national target indicators of the target 4.c in the year 2020. Bangladesh has three 5-year national development plans in the SDG period: 2016 to 2020, 2021 to 2025 and 2026 to 2030. SDG targets are nationally set by steps to be reached by the consecutive 5-year plans. Experimental results are not deliberate here to draw a generalized conclusion, however, the factual findings will lead to new target setting in future (Saunders, Lewis, & Thornhill, 2012). The secondary empirical data of indicators were collected from the database of UNESCO Institute of Statistics (UIS) and the SDG Tracker Bangladesh's Development Mirror. These data were the vital sources of contributing to the future decisions of actions and modifications. A detailed plan for achieving all targets of Goal 4 is formulated with 43 thematic indications among which 11 are the global indicators (UNESCO, 2017). For simplification and relevance, this study accepted global indicators of target 4.c are into account. In the full SDG framework of indicators, there are 231 unique indicators framed for the goals and targets in different sectors. Though the total number of indicators is 247 where some of the indicators are overlapped through more than one goals or targets. According to the agreed document of SDG, there are five accepted global indicators of the target 4.c under the goal 4 (Table 1).

However, nations had the scope of prioritising selective indicators in the respective national context. In Bangladesh, a total of 40 National Priority Targets (NPT's) had been formulated for showcasing the SDG status of different sectors of Bangladesh including education. The priority targets NPT-9 to NPT-13 are relevant to SDG 4 with the specific responsibilities assigned to different government agencies (SDG Tracker).

Values in some indicators for some certain years were found blank. Cubic spline interpolation[1] was used for filling up the missing cases of the time series data of the indicators. Martin Marsden (1974) introduced the background mathematics and theoretical proofs of cubic spline interpolation for continuous functions for estimating missing values in a series. Interpolation, in general, is one of the widely used methods for filling out the missing values in a trend or time series data (Lepot et al., 2017). Several other data sets, complementary and supportive to these indicators, were taken into analyses from sources of statistical portals of the Bangladesh government.

[1]Spline interpolation is a method, which gives an interpolating polynomial that is smoother and has smaller error than other interpolating polynomials in Lagrange interpolation and Newton-Gregory interpolation.

Table 2: Target 4.c data of the SDG 4 indicator in Bangladesh						
Indicator	Level	2013	2014	2015	2016	2017
4.c.1 Teachers with formal training (Percentage)	Primary	35.31^β	42.56^β	47.46	50.01	50.21
	Low. Sec.	59.61	60.85^β	63.38^β	67.20	72.31^β
	Up. Sec.	56.19	55.75^β	56.54^β	58.54	61.73^β
	Non-F Hi.	5	25^χ	50^χ	75^χ	97.13
	Tertiary$^\alpha$	-	-	-	-	-
4.c.2 Pupil-Trained teacher ratio (Headcount)	Primary	84.75^δ	70.32^δ	63.05^δ	59.84^δ	59.6
	Low. Sec.	61.86	64.15^β	63.89^β	61.08	55.72^β
	Up. Sec.	59.16	61.91^β	60.35^β	54.49	44.34^β
	Non-F Hi.	777^δ	155.41^δ	77.70^δ	51.80^δ	40.00^χ
	Tertiary$^\alpha$	-	-	-	-	-
4.c.3 Qualified teachers (Percentage)	Primary	30^χ	61^β	87^χ	100	100
	Low. Sec.	98.22	99.11^β	99.7^β	100	100
	Up. Sec.	98.16	99.08^β	99.69^β	100	100
	Non-F Hi.	100	99.21^δ	98.45^δ	97.75^δ	97.13
	Tertiary$^\alpha$	-	-	-	-	-
4.c.4 Pupil-Qualified teacher ratio (Headcount)	Primary	100.17^δ	49.26^δ	34.54^δ	30.05^δ	30.05
	Low. Sec.	37.54	41.48^β	42.65^β	41.05	36.68
	Up. Sec.	33.86	33.24^β	32.59^β	31.9	31.18
	Non-F Hi.	29.14^δ	29.37^δ	29.60^δ	29.81^δ	30.00^χ
	Tertiary$^\alpha$	-	-	-	-	-
4.c.5 Attrition rate of teachers (Percentage)	Primary				4.94	
	Low. Sec.$^\alpha$					
	Up. Sec.					8.02
	Non-F Hi.$^\alpha$					
	Tertiary$^\alpha$					

[Source: UNESCO Institute of Statistics and SDG Tracker

Indicator 4.c.5 was discarded as it had insufficient records available. The education level 'Tertiary' was also disregarded through all indicators as no record of data was available.

The objective of this study is to make summary of the current condition of the

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$^\beta$ Spline interpolation data

$^\chi$ Trend in time series data

$^\alpha$ Data not available

$^\delta$ Calculations from teacher student ratio

target 4.c of SDG goal 4 in Bangladesh. Influencing factors such as existing pupil-teacher ratio and tertiary education status of 25+ year old population are considered in this study. Finally, a set of recommendations is derived from the discussions on the findings of indicators and relevant influencing factors.

pupil-teacher ratios in different educational levels. However, pupil-teacher ratios are high in Bangladesh in general. Table 4 shows the pupil-teacher ratios in various types of educational institutions (Nath et al., 2019). In the targets set for indicator 4.c.1, the proportion of teachers who would be

Table 3: Targets set in Bangladesh to achieve for indicator 4.c.1 in three 5-year plans				
Indicator	Level	2020 (%)	2025 (%)	2030 (%)
4.c.1:	Primary	75.00	100.00	100.00
Teachers with	Low. Sec.	73.00	85.00	100.00
formal training	Up. Sec.	60.00	80.00	100.00

[Source: SDG Tracker] (Non-formal Higher education and Tertiary level data are not available.)

3. Methodology

Looking back to the targets set by the Bangladesh government is essential to compare the present status with the phase-by-phase goals to reach. The national SDG tracker of Bangladesh shows the achievement multi-dimensional social and economic factors are involved in pupil-teacher ratio. No targets were found as set by the government agencies to reduce the

receiving at least the minimum organized teacher training, in three 5-year plans by the years 2020, 2025 and 2030 (Table 3).

Education Watch 2018-2019 Report on secondary education condition in Bangladesh, Nath et al. (2019) suggested taking measures for reducing the pupil-teacher ratios. Measures to reduce pupil-teacher ratios have direct influence on the indicators of 4.c.2 and 4.c.4.

Table 4: Secondary level pupil-teacher ratio in Bangladesh according to institution types		
Institution type	Pupil-teacher Ratio	Remark on institution type
Government	33:1	All institutions at different education levels
Non-government	41:1	All institutions at different education levels
School and College	49:1	Secondary and higher secondary institutions both government and non-government.
Dakhil Madrasa	19:1	Secondary level religious institutions
Senior Madrasa	24:1	Higher secondary level religious institutions
Schools	40:1	All secondary and higher secondary level institutions
Madrasas	21:1	All types of religious institutions
Rural Institutions	41:1	Educational institutions situated in rural areas
Urban Institutions	35:1	Educational institutions situated in urban areas
Total	39:1	

[Source: Education Watch 2018-2019]

4. Findings and their Interpretation

Regarding teacher training, highly ambitious targets are set for indicator 4.c.1 that states that 75% of primary teachers would be getting organized training by 2020, although the rate of teachers with organized training was only 50.21% in 2017 (Table 2). In the same year in the sub-Saharan African region, the world's lowest percentages of trained teachers were recorded in pre-primary as 48% and primary as 64% (United Nations, 2019). Having the achievement before 2020 on hand in the Bangladesh primary education context, it is clearly absurd to reach the target of 100% by the year 2025. At the end of Millennium Development Goal status, the baseline data were not seemingly taken into serious consideration. Revisions of targets are essential for indicator 4.c.1 for the primary level of education.

On the contrary, the target of indicator 4.c.2 for the lower secondary level was set underrated. This target was only 73% by 2020, which was nearly achieved by 2017. The data shows that 72.31% teachers in the lower secondary level were already trained by 2017 in Bangladesh (Table 2), while the world's lowest was 50% in secondary education in sub-Saharan Africa (United Nations, 2019). The current trend also confirms that the targets in 2025 and in 2030 will be easily fulfilled before time. The effort and resources planned for achieving this target could be properly utilized in other areas of the same level of education. A favorable pupil-teacher ratio can be targeted (Nath et al, 2019) to positively influence the data of indicator 4.c.2.

Surprisingly, the target of indicator 4.c.3 for the upper secondary level of education had been reached much earlier than the target year. Approximately, 62% of teachers at the upper secondary level got organized training by 2017 (Table 2) while the target was set at only 60% by 2020. It can reasonably be expected that, the targets of 80% in 2025 and 100% in 2030 will also be attained before time. Yet, it is important that the proper planning of resources is to be fine tuned with the current context.

Insufficient or no data were available for the other two levels: (i) Non-formal Higher Education and (ii) Tertiary Education. For both of these levels, it is presumed that all the teachers are generally trained in their vocational/technical and theoretical subjects with necessary skills and education. Setting targets for these two sectors may not be justified in this point of view. But, the two sectors have two different contexts in respect to specific focus of vocational skill or subject. More rigorous study on this matter may bring significant findings. On the other hand, pupil-trained teacher ratios are the automatic trends influenced by the actions taken to improve the situation of proportion of teachers facilitated with minimum level of organized training.

It can be summarized that Bangladesh has achieved or on the way of achieving the SDG targets of indicator 4.c.3, proportions of qualified teachers, at all education levels except the levels of higher education. Achievement in the Tertiary level, both non-formal and formal, is undecided as the data are not available. The fact of the condition can be viewed in different perspective and analyzed thereby for coming to a conclusion. Table 5 shows the attainment rate of the population of 25 years old or more which shows constant improvements from 2012 through 2016.

Improvement in the attainment rate is an outcome of qualifications and training of teachers in the tertiary level. On the contrary to this nationwide fact, a subject focused study shows that subjects are taught in schools by the teachers who are not graduated in the respective subjects they teach. An article identifies that a significant number of teachers, recruited as 'qualified' teachers with specializations in various subjects other than Mathematics, are responsible to teach Mathematics at lower secondary and upper secondary levels (Das & Cleesuntorn, 2019). National standard of teachers' qualification needs to include consideration of subject attachments in academic attainments of the incumbent teachers.

Table 5: Academic Attainment Rate (%) of Population of 25+ years at Tertiary Level					
Degree	2012	2013	2014	2015	2016
Bachelor	5.87	5.50	5.85	8.24	8.51
Masters	1.73	1.97	2.06	3.33	3.48
Doctoral	0.08	0.09	0.10	0.16	0.17
Total=	7.68	7.56	8.01	11.72	12.16

[Source: UNESCO Institute of Statistics]

5. Recommendation and Conclusion

General Economics Division (GED) of Bangladesh Planning Commission is the secretariat of the SDGs Implementation and Monitoring Committee. This high-level committee is basically responsible to prepare target points of the SDGs. The recommendations from this study may be supportive to this committee and other relevant governmental policy-making agencies for preparing and modifying SDG target points. Before concluding this article, the following set of recommendations is made based on the analyses and discussions on the findings:

- The particular target of indicator 4.c.1 for the primary level can be revised as 80% by 2025 and 100% by 2030.
- The particular target of indicator 4.c.1 for both lower secondary and higher secondary levels can be revised as reasonable. The resources already allocated for teacher training need to be redistributed accordingly towards proper utilization for the development of education quality.
- Definition of qualification for recruiting teachers may include the subject focus or specialization of the teaching candidates, especially for lower secondary and upper secondary levels.
- Pupil-teacher ratio, in every educational level where applicable, can be reduced by setting step-by-step targets by the end of the years 2025 and 2030.

At the end of first 5-year phase within the SDG period, a prudent and practical modification of the targets will help achieve SDG education goals on time. This study may contribute to the National Priority Targets' revision process of the Government of Bangladesh, for the SDG Targets of 4.c in particular and the Goal 4 at large.

Limitation of the study includes exclusion of the global economic context and teacher training facilities provided by the developed countries for the least developed or developing countries.

This study may be used as a baseline for further studies on SDG target 4.c in future. The author hopes more researchers will study on SDG 4 attainments in Bangladesh.

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