

SECTION 4: FINDINGS FROM FOCUS GROUP DISCUSSION (FGD)

4.1 Introduction

FGD is very important for planning, performance and evaluation of any particular development plan. In our study, FGD of 8-12 nurses from public and private hospitals helped us to assess their job satisfactions, problems, social attitude, present level of the curriculum, way of teaching and teaching materials. The main theme of Plan of Nursing Development is to make a plan of nursing services having global standard of nursing. Here the nurses of public and private hospitals are the key personnel to identify the problems, barriers, possible solution and the areas of interactions. Since most of the nursing professionals are female and a significant percentage of the people in our county are illiterate or less educated, they do not socially recognize the profession as a good one and consider it as a profession of bad girls. The girls who are enrolled in nursing usually come from rather low income families that is why they do not have strong voice in the society. But the nurses informed that they selected the profession according their own desire. They think that it is a good profession of providing services to patients which they badly need at the time of sickness. They added that with their knowledge of nursing they can serve not only the patients but also their family members and relatives. It is also a less competitive profession and is relatively easy to get the job. So, this profession makes them self dependent and they are very happy to contribute to their family. As different health hazards are present in the society and they can provide necessary healthcare related help to the family and relatives. Another important thing is that the nursing authority is female and nurses feel comfortable to work with female colleagues.

4.2 Attitudes and opinions of parents and close relations for selecting nursing profession

Hundred percent of the respondent nurses informed that there is a strong objection from parents and close relatives. There is an image crisis of nurses in our society, so the profession is neglected. The main concern of parents and relatives is that it may not be possible to arrange a good marriage of the daughter having such profession. Another cause of reservation is that they can not get married in their first 4 years of service. It is very important that to raise the status of nurses more innovative and motivational steps are required in this regard.

Some of them replied that their brothers and sisters studying in different universities would not like to introduce them to their friends as nursing students or nurses. The villagers and neighbors did not want to maintain the relationship with these families. Most of them did not want to visit their house before they had past the nursing courses. Some of them replied that due to social barrier father threatened to disinherit them. But some also replied that their father took it easily while the neighbors did not.

4.3 Level of job satisfaction

Almost all of them replied that they had the job satisfaction of no more than 50 percent. They had no promotion or upgradation for a long time and sometimes in whole life. Some of them replied that they were going to retire from the job but still staying in the post of senior staff

nurse. But the other professionals who joined at the same time were promoted to the next post or even higher.

The nurse patient ratio and nurse doctor ratio are very small compared to the global standard. So, it is very difficult for them to ensure quality nursing for the patients. As there is insufficient number of ward boys, ayas, and cleaners, sometimes they have to do their duties especially in the night shift. It is almost regular that in the night shift a ward of 60 to 70 patients is served by one or two nurses. They do not have any extra allowance for the night shift. It is very painful for them when they leave their sick children at home for the nursing of other people. They suggest to all the patients breast feeding for 6 months to the child but they do not follow it as the maternal leave is for 4 months. Nurses of the hospital are responsible for everything from food to bed sheet. For that reason they can not concentrate on nursing all the time, as a result the quality of nursing of the patients is hampered. There is no residential facility near the hospital or clinics, so it is very difficult to come at night and in heavy rains from after.

4.4 Level of curriculum, teaching and teaching material

The present curriculum is better than the earlier one as it was reviewed by WHO and experts from Thailand. It is not sufficient but has the global standard. There should be some changes in the curriculum and it is in continuous reviewing process to accommodate the national and global changes. If it is not regularly updated then the new diseases are not known to them and proper nursing will not be ensured in this situation. The instructors of nursing institutes and colleges remain in the same posts year after year and they are not trained further like hospital nurses, so they can not provide quality education. In the updated curriculum there are some modern topics like computer, internet etc., but the trained instructors in the above field are not available in Bangladesh. There is a laboratory in a nursing institute/college usually. But almost all institutes/colleges suffer from paucity of instruments. If the nurses are trained adequately then it is possible to provide quality nursing to patients.

4.5 Way of raising the current nursing level to global standard

Nurses are the major part of contact with patients. They play a crucial role in maintaining the quality of health care as well as ensuring technical and management aspects of the hospital. The main deficiency of nursing services in Bangladesh that fails to meet the global standard is the inadequate number of nurses and teachers. There is a huge gap between the ratio in Bangladesh and the global standard ratio. On the other hand they perform their duties in almost all wards of the hospital. But they have expertise of dealing with general cases only. They take care of all the diseases, as a result the quality of service is not ensured. Most of the nurses come from places far away from the hospital and the transportation is not good, so it is very difficult for them to come to hospital for night shift and in heavy rains. The working hour and the salary structure of the nurses are not consistent with global ones which have an indirect effect on the quality of nursing. There is no risk allowance when they are dealing with the patients of communicable diseases. The most worrisome thing is the uniform of the nurses for performing their duties.

The specific recommendations are

- The number of nurses should be increased to match the global ratio.
- Social awareness program should be taken up for the nursing services, so that the brilliant students are made interested to come in this profession.
- There should be a specific promotion/upgrading rules for them. The performances of service should be considered as the key component of the promotion.
- The working service span of nurses should be reduced, as they are not able to provide quality service at the age of around 60.
- The maternal leave should be for 6 months so, that they can breastfeed their child up to 6 months which they suggest to the patients.
- The responsibility of keeping account of bed sheet and other utilities should be excluded from their duty for ensuring quality nursing of patients.
- The curriculum should be reviewed periodically for the purpose of updating it with the knowledge of the newly discovered diseases and other health issues.
- Teachers should be trained up regularly in the country and abroad and their salary should be reviewed.
- Adequate number of laboratories should be ensured with modern teaching materials for practicing.
- The duty of the nurses should be assigned as per their expertise in the areas of nursing to ensure quality nursing.
- Provision of residence near the facilities or transportation will help them deliver better nursing services.
- The shifting duty hours should be consistent with other profession.
- There should be a risk allowance.
- The uniforms should be changed into a new comfortable one.

SECTION 5: PROJECTION OF SUPPLY AND DEMAND OF NURSES

5.1 Estimation of Demand and Supply of Nurses by 2020

The quality of health care in a country and effectiveness of its health system are directly dependent on the availability of adequate nursing manpower. Bangladesh has an acute shortage of nursing manpower. It is facing difficulty to fulfill the nursing requirement of patients in hospitals as reported in many research papers and discussions. Here, the analyses of demand and supply of nurses in the country are made to give a clear picture of nursing human resources scenario up to 2020. The demand and supply analysis is not the same classical economic analysis. In economics market mechanism determines the demand and supply of any good or service. Here demand analysis is based on the perspective of effective health systems. Demand is basically the requirement of the health system of the country according to standards. It also uses the existing practices of health system to estimate demands for nurses. Supply of nurses is the ability of the training and educational institutes to produce qualified registered nurses. This analysis is intended to help strategic decision making for improving human resource situation in nursing in the country.

5.2 Review of Growth of Resource Components of Health Systems

A health system is composed of four resource components – human resources, establishments, finance and technology. Doctors and nurses are two key components of health human resource and the number of doctors often affects the demand for nurses. Establishments include hospitals and other health institutions and facilities inside them. The number of hospital beds is a key determinant for demand of nurses. Application of medical technology depends on the availability of qualified nurses and finance is the key determinant for ensuring availability of nurses. Here an analysis is performed on the growth scenario of hospitals, hospitals beds, doctors and nurses in Bangladesh for the period of 1985 to 2005. The method of analysis and detailed table is given in Annex C.

It is observed that the annual expansion of doctors is larger than that of the nurses (RTM, 2008). Private sector is growing faster in terms of number of hospitals compared to public sector and also in terms of hospital beds. But the addition of hospital beds is larger in the public sector compared to the private sector. It may be an indication that small sized hospitals are dominating the private sector. The number of doctors is increasing 1.83 times more than the number of nurses every year. The doctor to nurse ratio in 2005 was 1: 0.48. If the reported annual addition continues for doctors and nurses, by 2020 the doctor to nurse ratio will be 1:0.47. The effective doctor to nurse ratio is 1:3, and the expected decline in doctor to nurse ratio will worsen the quality of health care in the country. It is expected that by year 2021 there will be 2.11 times more hospitals in private sector than public sector. But the number of private hospital beds will be only 0.54 times of public sector. Public sector will be dominating as health care provider in the country till 2020.

5.3 Demand Projection for Nurses

Demand for nurses may be estimated on the basis of population size, number of doctors in the country, number of hospital beds and actual basis as defined by health administrators. It is

quite difficult to estimate the future demand for nurses on actual basis, especially in underdeveloped or developing nations, because of absence of long-term strategic plans. The MOHFW of Bangladesh Government used to adopt five year strategic plans for health sector but makes frequent changes in the plan during implementation or often fails to implement properly due to resources constraints. Hence, estimation of demand for nurses in Bangladesh is calculated primarily on the basis of other variables than actual.

Bangladesh has one nurse for every 6442 population or 1.56 nurses for every 10,000 population. There is a debate as to what should be the perfect nurse to population ratio. In developed countries there are 40 to 70 registered nurses for every 10,000 population, but they feel shortages of nurses. The World Bank in 1993 in its publication “Investing in Health” suggested 2 nurses for every 10,000 population as the minimum requirement for an effective health system. Using the existing nurse population ratio and standard specified by World Bank, the requirement of nursing manpower has been estimated in the Table in Annex D in detail. In addition to population, requirements of nurses are estimated on the basis of doctors and hospital beds in the same table. At present, there is one nurse for every 2 doctors in Bangladesh when the standard is 4 nurses for one doctor. It is standard that there should be one nurse for every four beds as minimum and it should be in shift of duty. The survey of this study shows that the nurse to beds ratio in Bangladesh is 1:13 at only morning shift. But the standard is 1 nurse for 4 beds as maximum for every shift.

Figure 5 - 1 : Demand for nurses based on existing ratio of nurse to population, hospital beds and doctors

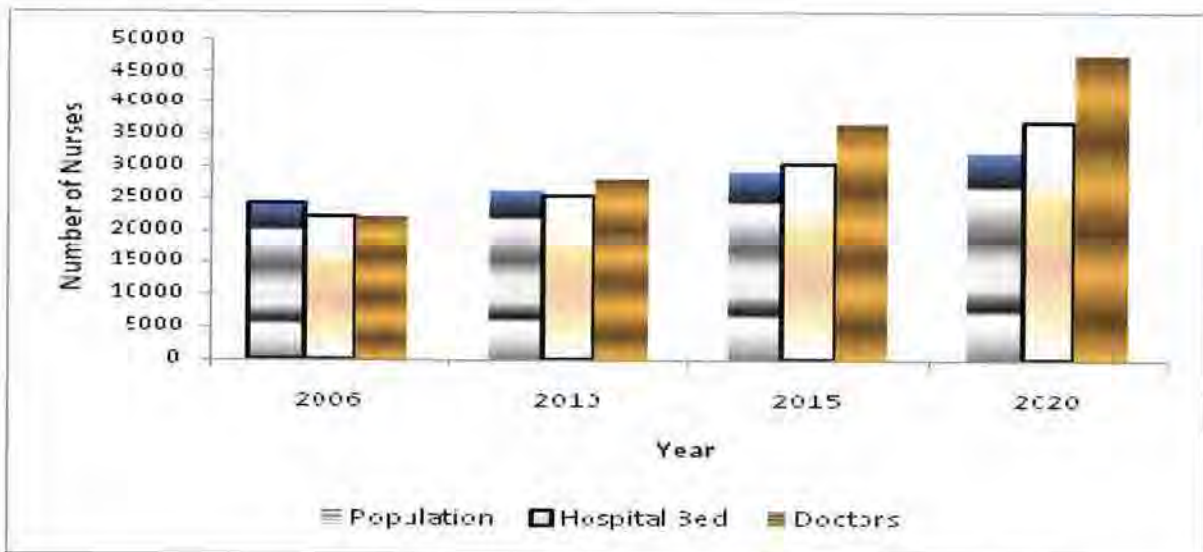
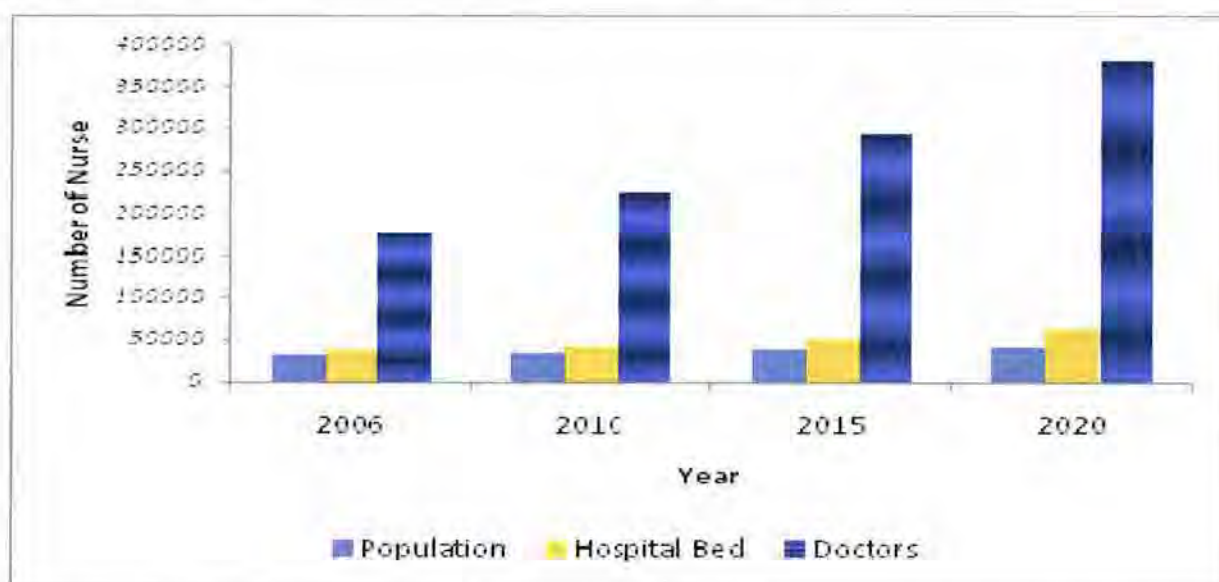


Figure 5-1 shows the demand for nurses following the existing country standard. Demand for nurses by 2020 will not vary significantly for three different projection variables. Population and doctor based demands will be higher than hospital beds based demand. However, Figure 5-2 presents a little different scenario. This figure presents the demand for nurses following standard ratio of nurses to population, hospital beds and doctors. Population and hospital beds affect demand almost at the similar levels. But the doctors based demand is very high. About 380684 nurses are required to establish an effective doctor to nurse ratio in the country in 2020. By 2020, demand based on the standard ratio of nurse to doctor may be 9.23 times of

nurse to population ratio and 6.02 times of nurse to hospital beds ratio. This explosive demand for nurses vis-a-vis doctors is a clear indication that doctors are not getting adequate nursing support to provide effective care to patients.

Figure 5 - 2 : Demand for nurses based on standard ratio of nurse to population, hospital beds and doctors



5.4 Projection of Sector-wise Demand for Nurses

The demand for nurses in Bangladesh can be divided in three sectors – public sector, private sector and international sector. Possible demands for each sector are projected separately below.

5.4.1 Public Sector

As stated earlier in this chapter, it is difficult to estimate the actual future requirement of nurses in public sector because of uncertainty in planning of the government. It is observed that majority of nurses in public sector of the country are working in the hospitals and other health care facilities. About 2.75 percent of the nursing employees are working in administrative and educational institutes. So, the demand for nurses may be estimated using the following methodology stated in Chapter 2. It is a modification of the method for reality in data.

Total Demand for nurses in Government/Public Sector:

$$ND_t^{gov} = \sum_{k=1}^n NP_{kt} F_{kt} + Ad_t + Ac_t + O_t$$

Demand for nurses in hospitals/clinics:

$$\sum_{k=1}^n NP_{kt} F_{kt} = (Hospital\ Beds \times 3) \div Required\ nurse\ to\ bed\ ratio$$

Demand for nursing in education and administration:

$$Ad_t + Ac_t + O_t = (\text{Demand in hospitals}) \times 2.75\%$$

Table 5- 1 : Estimation of demand for nurses in the public sector for the period of 2006-2020.

Year	Projected Hospital Beds	Hospital Demand		Other Demand		Total Public Sector Demand	
		Existing Country Ratio	Standard Ratio	Existing Country Ratio	Standard Ratio	Existing Country Ratio	Standard Ratio
2006	35509	12652	26632	348	732	13000	27364
2007	36262	12920	27196	355	748	13275	27944
2008	37031	13194	27773	363	764	13557	28537
2009	37816	13474	28362	371	780	13844	29142
2010	38617	13759	28963	378	796	14138	29760
2011	39436	14051	29577	386	813	14437	30390
2012	40272	14349	30204	395	831	14743	31035
2013	41126	14653	30844	403	848	15056	31693
2014	41998	14964	31498	411	866	15375	32365
2015	42888	15281	32166	420	885	15701	33051
2016	43797	15605	32848	429	903	16034	33751
2017	44726	15936	33544	438	922	16374	34467
2018	45674	16273	34256	448	942	16721	35198
2019	46642	16618	34982	457	962	17075	35944
2020	47631	16971	35723	467	982	17437	36706

The demand of nurses in the public sector for the period of 2006-2020 is presented in Table 5-. The existing nurse to bed ratio at occupancy rate adjusted on three shift duty setting is calculated from survey data as 1:8.42. By 2020 the demand for nurses in public sector should be 17437 nurses and 36706 nurses according to existing ratio and standard ratio respectively. In 2008, 14054 nurses were working in the public sector. By 2020 the shortage of nurses in public sector, if this sector expands following the past trend, should be between 23.5 percent and 161.2 percent.

5.4.2 Private Sector

It is very difficult to obtain adequate data on health human resource from the private sector of the country without a comprehensive survey. In this context, the demand for nurses is estimated on the basis of hospital beds in this sector. Hospital beds are projected following

two methods. First is the time series projection technique, where time is independent variable and hospital bed in the private sector is dependent variable. The second method expresses the number of hospital beds as a function of four variables – number of hospitals in the private sector, size of population of country, per capita GDP in local currency and proportion of urban population. The estimated regression equation has an adjusted R-square value of 0.990, F-statistics 383.47 and significance 0. Using the estimated coefficients, the estimation model has been developed as follows. The equation shows that general population have negative effect on private sector hospital beds. But the proportion of urban population has positive impact on private sector hospital beds. The other two variables influence private sector hospital beds positively. Table 5-2 shows projected hospital beds and respective demand for nurses. Here, occupancy adjusted three shift nurses to bed ratio calculated from the survey data has been used for estimating demand and also standard ratio.

$$HosBed = 16105 + 0.813 Hospital + 0.033 GDP + 0.167 Urban - 0.004Population$$

Table 5- 2 : Estimation of demand for nurses in the private sector for the period 2006-2020

Year	Projected Hospital Beds		Demand for Nurse (Time Series)		Demand for Nurse (Model)		Mean Demand for nurses	
	Time Series	Estimation Model	Existing Country Ratio	Standard Ratio	Existing Country Ratio	Standard Ratio	Existing Country Ratio	Standard Ratio
2006	17115	17331	12167	12836	12321	12998	12244	12917
2007	18188	17376	12930	13641	12353	13032	12638	13333
2008	19328	17422	13740	14496	12385	13067	13045	13763
2009	20540	17468	14602	15405	12418	13101	13466	14207
2010	21828	17515	15518	16371	12452	13136	13900	14665
2011	23197	17563	16490	17397	12485	13172	14349	15138
2012	24651	17611	17524	18488	12520	13208	14812	15627
2013	26197	17660	18623	19648	12554	13245	15291	16132
2014	27839	17709	19791	20879	12589	13282	15785	16653
2015	29585	17759	21032	22189	12625	13319	16295	17191
2016	31440	17810	22350	23580	12661	13357	16822	17747
2017	33411	17861	23752	25058	12698	13396	17366	18322
2018	35506	17914	25241	26629	12735	13435	17929	18915
2019	37732	17967	26824	28299	12772	13475	18510	19528
2020	40098	18020	28506	30073	12811	13515	19110	20161

The estimation of demand for nurses is conservative compared to time series estimation. It is 76.4 percent of the time-series estimation. For a reliable estimate of demand for nurses in private sector, the geometric mean of the two forecasting methods may be used to get a single estimate. It is estimated that in 2008 there were about 2500 registered nurses employed in the

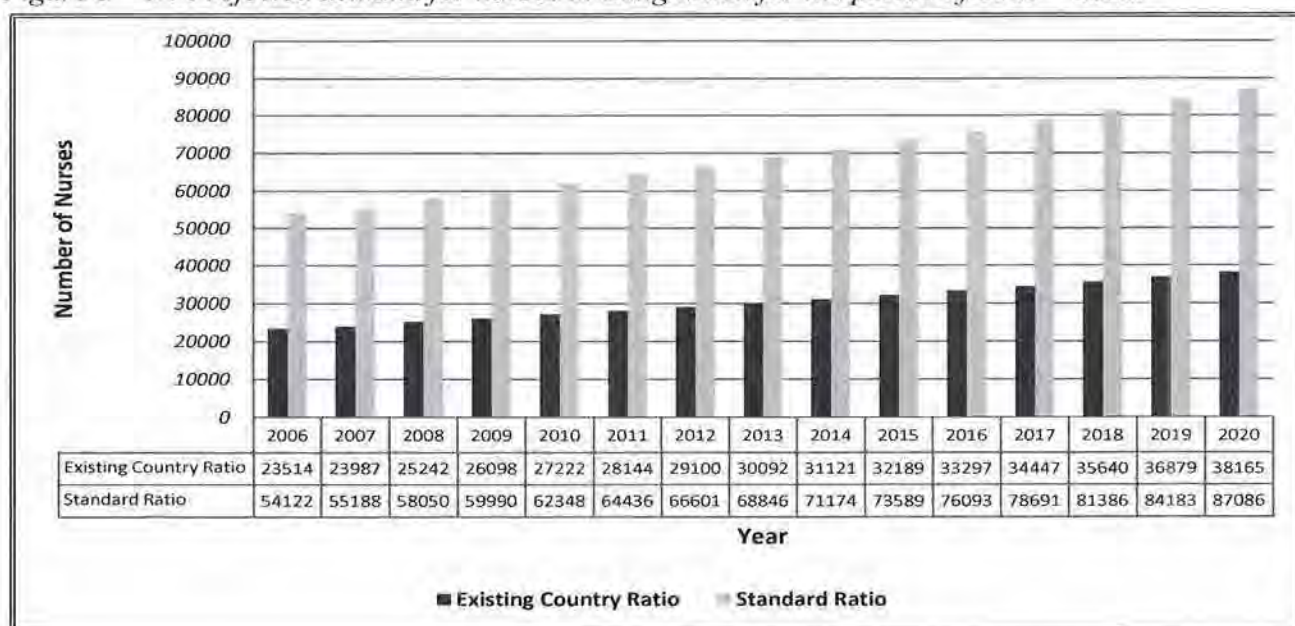
private sector. By 2020, the estimated requirement may be between 19110 nurses and 20161 nurses. There is a huge potential demand for registered nurses in the private sector hospitals because about 8 times more nurses may be required by 2020.

5.5 Final Demand Projection for Nurses

Three methods of demand projection have been used in this study. Demands for nurses are projected on the basis of population of the country; basis of available doctors in the country and base of expected hospital beds in the country. Finally, demand for nurses is determined for three different sectors where nurses may have employments. These four different estimates may confuse the readers because of wide variations in projections. So, a mean of all four estimates are calculated to show a unified estimate of potential demand for nurses. Geometric mean is calculated for both the existing country ratio based estimates and standard ratio estimates. Geometric mean helps to remove wide variations in data and gives a reliable estimate. Figure 5-4 shows the total demand projections for the period of 2006-2020.

There is a wide variation in demand projection based on the existing health system condition of Bangladesh and what is considered as internationally accepted standard condition. The demand projection according to the existing country condition is about 44 percent of standard condition. It is an indication of how much below the present state of health system of Bangladesh lies compared to standard in terms of use of nursing. The gap between the two conditions widens further because of poor nurse to doctor ratio in the country. Probably there are more doctors in the health system of Bangladesh than what should be in comparison to availability of nursing manpower. Without nursing, health care quality cannot be improved even at the presence of very skilled physicians. Moreover, excessive use of physicians also increases the cost of health care because doctors are always expensive compared to nurses.

Figure 5 – 3 : Projected demand for nurses in Bangladesh for the period of 2006 – 2020.



5.6 Evaluation of Balance of Demand and Supply

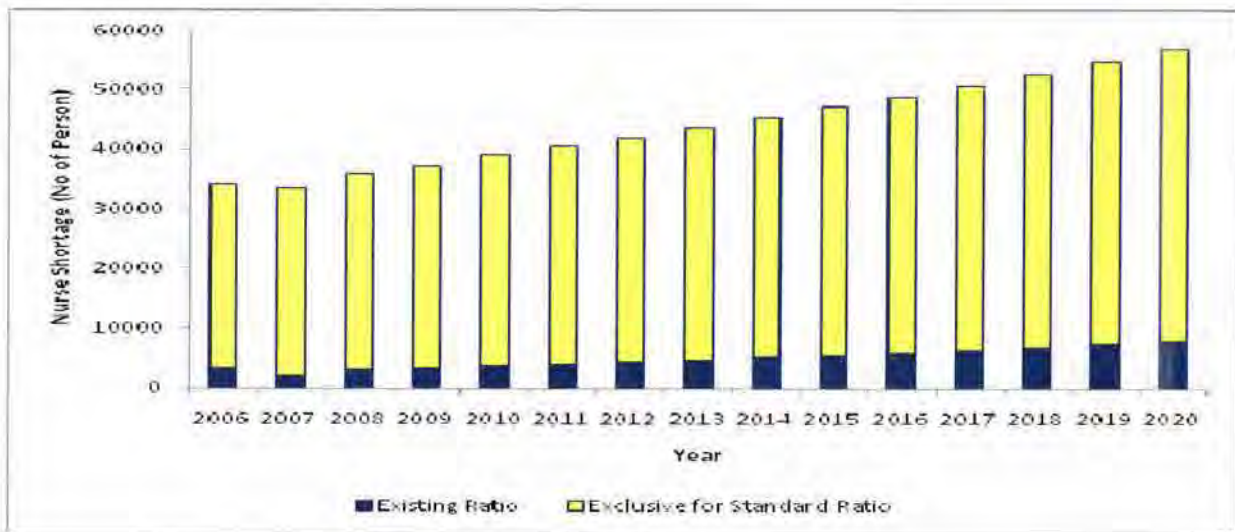
Table 5-5 presents the analysis of balance of supply and demand. It is expected that there will remain a short supply of nurses all through the period of 2006-2020. At the present growth level of supply of nurses, the deficit will be increasing by 2020 for demand based on country's existing standard. The deficit will be increasing at a rate of 6.1 percent. In 2006, deficit was 14.4 percent but may increase to 20.4 percent in 2020. The demand supply gap remains huge all through the period for demand of nurses at standard level. The deficit of nurses to meet the standard demand requirements is 62.8 percent and may increase to 65.1 percent by 2020.

Figure 5 –5 presents the analysis of shortages of nurse supply in percentages. In 2006, about 10 percent shortage was for incapability to meet country's existing standard of using nurses. The same figure becomes 13.8 percent in 2020. That year 86.2 percent shortage of nurses was expected for incapability to meet ideal standard for using nurses. Continuing higher shortages for nurses due to standard of nurse uses is an indication that, in coming years, the health system will fail to use the adequate number of nurses necessary to provide effective and quality health care to people of the country.

Table 5- 5: Analysis of projected supply-demand balance of nurses for the period 2006-2020

Year	Supply	Demand		Balance	
		Existing Country Ratio	Standard Ratio	Existing Country Ratio	Standard Ratio
2006	20117	23514	54122	-3397	-34005
2007	21943	23987	55188	-2044	-33245
2008	22289	25242	58050	-2953	-35761
2009	22871	26098	59990	-3227	-37120
2010	23468	27222	62348	-3755	-38880
2011	24080	28144	64436	-4064	-40356
2012	24709	29100	66601	-4392	-41893
2013	25354	30092	68846	-4739	-43493
2014	26015	31121	71174	-5106	-45159
2015	26694	32189	73589	-5495	-46894
2016	27391	33297	76093	-5906	-48702
2017	28106	34447	78691	-6341	-50585
2018	28839	35640	81386	-6801	-52547
2019	29592	36879	84183	-7287	-54591
2020	30365	38165	87086	-7801	-56721

Figure 5 - 4 : Separation of shortages in nurse supply for existing country standard and global minimum standard, 2006-2020



5.7 Size of Supply Necessary to Balance Demand by 2020

The analysis shows a deficit of supply throughout the period. It may be now useful to determine the level of supply sufficient to meet the demand by 2020. At the nurse growth rate or 0.0261 per year for 15 years period, using the equation 2.14 stated in chapter 2 of this report, it is possible to estimate the increases in nursing supply necessary to meet the demand by 2020. According to the existing country standard ratio, the shortage of nurses at the end of 2020 will be 7801 nurses. To cover this deficit, annual supply of nurses should be increased by 372 nurses in addition to the present level of nurses. But it is necessary to add 2703 more nurses in addition to the existing annual supply of nurses to meet the demand for standard ratio.

SECTION 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The initiative is helpful in planning to produce the sufficient number of skilled nurses. The government should create adequate number of posts for recruiting the produced nurses. If they recruit according to global ratio, the present scenario of the health sector will change dramatically within a short span of time. The establishment of new institute/colleges in public and private sectors will facilitate the production of nurses. Social awareness program will be taken up to build the image of nurses in the society and various incentives will be declared for the nurses for their performance so that the meritorious students become interested in nursing profession. Only the recruitment of nurses as per global ratio will not change the current scenario of nursing services. The government should provide the nurses with the necessary modern instruments and other supporting personnel for working with the professionals in a coordinated way. The specific findings of the study are:

- Seventy six percent of the nurses expressed their satisfaction as they serve the sick and injured people, 57 percent nurses were professionally satisfied while 71 percent reported their dissatisfaction in providing service due to shortage of nurses while 43 percent were professionally dissatisfied nurses. So, recruitment of sufficient nurses will certainly ensure better service.
- As regards the revision of curriculum 22 percent suggested to include sufficient practical classes and practices along with global standard curriculum. The present curriculum conforms more or less to global standard but the only limitation is the execution of practical class and practices due to inadequacy of teachers, equipment in laboratory and also shortage of laboratory.
- Due to the shortage of skilled teachers the quality of teaching is being seriously affected. So, it is necessary to recruit the required number of skilled teachers. The medium of instruction should be English and there should be very competent instructors in computer which is the key to modern nursing.
- The DNS should arrange higher education and training for nursing instructors in foreign countries and there should be in-service training for the nurses to aim at their career development.
- Proper evaluation and monitoring of nursing education and nursing service should be established which will help to make the health policy to develop quality nursing sustainable. Twenty eight percent nurses assumed that proper government initiatives and freedom from political interference (15%) should be helpful for the above policy.

6.2 Recommendations

In the absence of adequate and effective nursing, hospitals are incapable to provide required care to the patients. This country has acute shortage of qualified nurses. The quality of health care is directly dependent on the quality of nursing services. A common complaint of healthcare seekers in Bangladesh is that they do not get adequate and effective nursing support in local hospitals. In this country the ratio of doctor to nurse is 2:1. Global standard

doctor to nurse ratio is 1:4. So, in the absence of adequate number of nurses the whole health system faces the blame of poor quality care in Bangladesh.

Nursing is not only a noble service it is also a profession. There are thousands of educated but unemployed girls and boys in Bangladesh who may work as nurses and earn decent livelihood. Hospitals are suffering from shortages of nurses and boys and girls in this country are facing shortages of jobs. But people are not interested in nursing jobs due to the image crisis of nurses in the society as there is no career path and position.

Low standard of education in nursing institutes does not produce high quality nurses. There is no initiative to modernize the nursing education in the country. Again, many profit hungry private sector hospitals/clinics often do not employ qualified nurses because they are comparatively "expensive". These hospitals often employ unqualified persons as nurses. The combined effect of low standard of nursing education and non-employment of qualified nurses is reducing the standard and ability of nursing services in hospitals of the country.

Bangladesh should produce more nurses and should improve the quality of nursing training for three reasons. First, there is the requirement of more nurses in the public and private sector hospitals. To fulfill this unmet demand, more nurses are needed. Second, nursing may become a source of employment for women in the country. More employment of women may contribute to their empowerment in the society. Finally, more nurses are necessary to improve the quality of medical care in the country. So, the recommendations of this study are the follows.

- Job market for nurses in the country should be created because job potential will encourage more people to join this profession. Government may play a role in job market by increasing the size of nursing manpower in public sector at par with the global minimum standard. Vacant posts in the public sector should be filled up soon through recruitments. The government may play another role in the job market as regulator. It is necessary to formulate rules and regulations and apply those strictly on the private sector hospitals so that sufficient numbers of qualified nurses are recruited.
- The nursing education system in the country should be upgraded. It is necessary to modernize the syllabus and training procedures for nurses. Government may encourage public sector universities to open nursing faculties where young women and men can receive higher education in nursing. A university degree in nursing will raise the status of nursing profession in the country.
- There are many short-trained or untrained nurses in the private sector hospitals. Training programs may be arranged for these experienced but unqualified nurses. Some form of formal certificates and recognitions may be arranged for these people. It will give them professional identity and may improve their skill and quality of services.
- It is necessary to popularize the nursing profession in the country. Mass campaign is necessary in the electronic and print media and also in other social and cultural forums. The campaign should try to focus on the positive sides of the nursing profession.

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Findings of the Consultation Workshop

Model for Projection of Nurses:

- Population Nurse Ratio
- Patient Nurse ratio
 - General patient
 - ICU/High dependent
- Doctor Nurse ratio 1:1 or 1:2

How to meet the projected demand

- Increase the number of different categories of nurses
- Expansion of nursing education institution
- Increase the number of seats
- Faculty preparation (subject based)
- Post creation of teacher/nurses
- Incentive for the private entrepreneur for Edⁿ
- Deployment
- Career opportunity in nursing
- Opportunity for foreign employer

Shortcoming of nursing policies

- Limitation/lack/no strategic plan for GoB and privates
- Little involvement of nurses in policy level
- Lack of recourses
- Limitation of recruitment rules
- No regulation and monitoring mechanism
- Lack of research on nursing needs
- Poor salary with job insecurity and shortage (in private sector)

Ensure Quality teaching

- Nursing specialty
- Appropriately designated and recognized
- Faculty development- Acute shortage
- Monitoring and evaluation

Ensure quality services

- Career opportunity
- Post creation and promotion policy
- Essential supplies to be in place
- In service training
- Transportation and accommodation

Strengthening monitoring system on information

- Strengthen MIS- need manpower
- Policy/guideline for monitoring and evaluation
- Monitoring and evaluation cell to be in place
- Infrastructure

Uphold image of nursing

- Increase social status
- Increase Government position with recognition
- Social activities by nurses

List of Key Informants

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4. Dr. Siddheshwor Mojumdar, Civil Surgeon, Manikgang Hospital
5. Dr. Daud Ali Mir, Deputy Civil Surgeon, Khulna Sadar Hospital
6. Ms. Shuriya Begum, Registrar(in Charge), BNC
7. Ms. Jahanara Begum, Director (in Charge) DNS
8. Chabi Rani Dhar, DD(education) DNS
9. Getashree Ghosh, Deputy Registrar, BNS
10. Tahmina Akter, Nursing Instructor, Khulna Nursing Institute
11. Gulshanara Begum, Nursing Instructor, Khulna Nursing Institute
12. Sayeda Rokhsanara Begum, Nursing Instructor, Khulna Nursing Institute
13. Most. Khorsheda Khatun, Nursing Instructor, Khulna Nursing Institute
14. Hosne Ara Khatun, Nursing Instructor, Khulna Nursing Institute
15. Most Shahinur Begum, Nursing Instructor, Khulna Nursing Institute
16. Mainosi Rojario, Nursing Supervisor, Moulana Bhashani Nursing Institute Dhaka
17. Shefali Flora Chicham, Nursing instructor, Moulana Bhashani Nursing Institute Dhaka
18. Saleha Khatun, Instructor, College of Nursing, Mohakhali, Dhaka
19. Taslima Begum, Instructor, College of Nursing, Mohakhali, Dhaka
20. Mrs. Ajijun Nahar, Principal, College of Nursing, Mohakhali, Dhaka
21. Mohsina Khatun Mukti, Nursing instructor, Institute of Child Health, Dhaka
22. Konika Bhattayacharja, Nursing instructor, Institute of Child Health, Dhaka
23. Shamima Akter Khatun Shuchi, Nursing instructor, Institute of Child Health, Dhaka
24. Rebeka Rebedu, Principal, Institute of Child Health, Dhaka
25. Dr. Momena Khatun. Health Advisor, Pogram Support Unit Of CIDA
26. Ms. Farida Begum, National consultant, WHO

Results of In-depth interviews

Are you satisfied with the service you provided?		
Responses	Frequency	%
Yes	47	57
No	35	43
Total	82	100
If yes, why do you think so?		
Responses	Frequency	%
As a supervisor I am satisfied	1	2
Great occupation/ I can provide service to others	28	60
It's a job/ I have become self dependent for this profession/ source of income	4	9
I am performing my duties properly/ I am aware about my duties	3	6
As I provide training to the HA/FWA at the grass root level they can provide treatment to the mothers and children	1	2
Doctors and nurses works properly, we don't feel any problem	2	4
Environment of work is good/ management is good/ everyone helps each others	3	6
Getting respects from the patients	2	4
We have become 2nd class employee and we have the opportunity of learning	1	2
As the government is working for the development of nursing sector for this I am satisfied	2	4
Total	47	100
If no, why?		
Responses	Frequency	%
Sometimes doctor/patients and attendant of the patients misbehave with us	4	9
There are shortage of the equipment/ medicine in the hospital so we can not provide treatment properly	3	7
We are not evaluated in regard to our experience and skill	5	11
Low salary/ work load more	5	11
Here some groups gets preference, our works are not properly evaluated	2	5
Shortage of manpower	4	9
We do not get the relevant training	2	5
We do not get respect from the patients and doctors	1	2
Peoples perception for this profession is not good	1	2

The working environment is not good	1	2
Work load more, we could not provide service properly	12	27
Many of us are in deputation	1	2
We do not get leave	1	2
There is no residence facility	1	2
For bureaucratic complicity	1	2
Total	44	100

Do you have any problem in discharging your services?

Responses	Frequency	%
Yes	52	63
No	30	37
Total	82	100

If yes, what types of problems you have to face?

Responses	Frequency	%
Sometimes patients do not want to get injections timely/ they have their own opinion	2	3
Patient and their relatives misbehave with us	21	32
As there is shortage of nurse there is no timetable for our duty	2	3
The attendants of the patients do not tolerate any delay in bringing medicine	2	3
As there is shortage of nurse we can not provide service properly	13	20
We have to obey our higher authority although they are right or wrong	1	2
There is shortage of medicine and equipment	7	11
No security	1	2
There is no sufficient residence facility for providing training	1	2
Sometimes we have to face problem for the visitors. They want to stay at night	1	2
Doctors misbehave with us	8	12
We have to do most of the works of the doctor	1	2
Insufficient bed for the patients	3	5
As there is shortage of cleaner, patients sometimes misbehave with us	1	2
There is mismanagement in giving roster duty	1	2
We have to face lots of problem for the leaders	1	2
Total	66	100

Do you think that the number of nurses in your facility is sufficient to provide quality nursing?

Responses	Frequency	%
Yes	22	27
No	60	73
Total	82	100

In your opinion, does the existing nursing curriculum require any revision?

Responses	Frequency	%
Yes	47	57
No	32	39
Don't know	3	4
Total	82	100

If yes, what type of revision do you suggest?

Responses	Frequency	%
Sufficient training should be provided for nurses	9	19
By increasing the number of nurses	2	4
As new course developed so it needs to be revised	3	6
They should follow text books rather than following guide books	1	2
Religious study should be included in the course	1	2
Viva exam should be introduced	1	2
Inspector should be present in the practical classes	1	2
It should be suitable for the age		0
There should be consistency in the curriculum with global standard	5	11
There should be practical classes	6	13
Orientation should be more tough	1	2
There should be PDA	1	2
Non-response	16	34
Total	47	100

Do you think that the method of teaching followed in nursing education is up to the mark?

Responses	Frequency	%
Yes	35	43
No	45	55
Don't know	2	2
Total	82	100

If no, which area needs to be improved?

Responses	Frequency	%
Should learn new methods	5	9
Should improve more/ should be modernized	6	11
There should be more monitoring and supervision from government/nursing council	2	4
More and skilled teachers should be appointed	10	19
Should provide training	3	6
Should include computer technology	8	15
Start class at right time and make them understand properly	1	2
There should be practical classes	10	19

There should be more teaching materials	4	7
The teaching system should be in English	2	4
Require digital machine	3	6
Total	54	100

What is your suggestion regarding inadequacy/irrelevancy of curriculum.

Responses	Frequency	%
The materials should be more developed/ modern	10	22
Should teach all new programs	3	7
Should increase the number of materials	14	31
More teachers should be appointed	1	2
There should be many types of books and CDs available	1	2
There should be arrangement of sufficient instrument for practical	4	9
Computer is required	3	7
Digital machine is required	3	7
The teaching materials can be imported from other countries	1	2
The government administration should be more tough	3	7
Take proper initiative	1	2
There is no consistency of curriculum with theory and practical	1	2
Total	45	100

What steps need to be taken to upgrade the standard of nursing education to match it with global standard?

Responses	Frequency	%
There should be sufficient nurses	7	4
There should be arrangement of resident facility	1	1
Arrange training/ higher education/ training in foreign countries	48	27
Training of teachers/ training from foreign countries	9	5
Improve security of the hospital	1	1
Nursing profession should be evaluated properly/ get respect	16	9
Regular posting/ arrangement of work opportunity	6	3
Provide quality care/ quality of care should be improved	6	3
Should follow reference books	1	1
Should admit good quality of students	3	2
Should emphasize more on English study	10	6
Computer study	7	4
Should improve the courses more	2	1
Appoint appropriate teachers	4	2
Should start practical classes	1	1

There should be religious study	1	1
Should appoint more teachers/ skilled teachers	13	7
Global standard curriculum	7	4
The teaching materials should be increased/ should be modernized	5	3
There should be option for library	1	1
The number of nursing institute should be increased/ should be improved	13	7
Increase salary/ allowance/ stipend	4	2
The junior midwife should get the opportunity for the BCC course	3	2
Should arrange BCC nursing course in districts also	1	1
Sufficient doctor, nurses, AYA, cleaner is required for providing proper care	2	1
Provide all benefits for nurses	3	2
Arrange work friendly environment for the nurses	2	1
Monitoring is required for each sector	1	1
Total	178	100

Do you think the existing number of nursing institute in public sector is adequate for providing the required number of nurses?

Responses	Frequency	%
Yes	20	24
No	62	76
Total	82	100

In your opinion, what are the barriers for establishing nursing institutes in public sector?

Responses	Frequency	%
No initiative from government	29	18
Shortage of money	27	17
Administrative complicity	7	4
Shortage of manpower	15	9
Shortage of necessary equipment	2	1
Political problem	21	13
Shortage of land	16	10
Late in taking proper decisions	4	3
Local or social problems	6	4
Negligence	12	8
Shortage of skilled teacher	13	8
No facility for higher study along with job	1	1
Not properly evaluated	2	1
Need of proper management	3	2
No barrier	1	1
Total	159	100

Steps need to be taken to overcome the barriers

Responses	Frequency	%
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Arrange money	12	11
Remove administrative complicacies	2	2
Increase manpower	10	9
Government should take initiatives	29	26
Relieve from political problems	16	15
Take quick decisions	4	4
Get rid of local problems/ should aware local people	5	5
Skilled teachers should be developed and appointed	9	8
Supply of necessary equipments	1	1
Send for getting training in foreign countries	3	3
Arrange local authority	1	1
Help form foreign/ non government NGO	4	4
Select proper space	7	6
Government should give more preference for health care	2	2
Supply of necessary equipments	1	1
Give respect for nursing profession	2	2
Increase the number of teachers	1	1
Arrangement of residence facility	1	1
Total	110	100

Do you think the existing number of nursing institute in private sector is adequate for producing required number of nurses?

Responses	Frequency	%
Yes	22	27
No	50	61
Don't know	10	12
Total	82	100

In your opinion, what are the barriers for establishing nursing institutes in private sector?

Responses	Frequency	%
Political influence	16	13
Risky	2	2
Difficult to get government approval	14	12
Lack of skilled teacher	13	11
Financial problem	23	19
Lack of ownership	20	17
Lack of proper management	2	2
Lack of initiative/ guideline from government	4	3
Shortage of land	9	7
Shortage of manpower	12	10
Problem in practicing clinical session	1	1
Short duration	1	1
Insufficient books	1	1
No residence facility	1	1
Lack of willingness	1	1

Difference in the quality of private and government sector	1	1
Total	121	100
Steps need to be taken to overcome the barriers		
Responses	Frequency	%
All kinds of assistance from the government	17	21
Job security	1	1
Develop skilled teachers	10	12
Assistance from the political groups	5	6
Arrange money	5	6
To reduce the corruption and complicity in the rules and regulations	2	2
Arrangement of land	5	6
Students should be qualified	3	4
Supply of required materials	1	1
Government approval should be more easier	5	6
Increase the number of seat for boys also	1	1
The rich people should come forward	11	13
Aware people about nursing profession	7	9
Arrange appropriate manpower	3	4
Nursing council and government should work together	1	1
Better coordination between government and non government organizations	5	6
Total	82	100

Results of KII

Age of the respondent		
Nursing Instructors		
Age range	Frequency	%
20 to 30	2	10
31 to 40	2	10
41 to 50	5	24
51 to 60	10	48
above 60	2	10
Total	21	100

Sex of the respondent		
Nursing Instructors		
Sex	Frequency	%
M	2	10
F	19	90
Total	21	100

Level of highest education.				
Nursing Instructors				
Level of Education	Frequency	%	Remarks	
Diploma in nursing	2	10		
B.Sc in nursing	17	81	MSc-2, MPH-4	
MBBS	2	10		
Others	0	0		
Total	21	100		

Marital status		
Nursing Instructors		
Status	Frequency	%
Married	19	90
Unmarried	2	10
Total	21	100

Length of service		
Nursing Instructors		
Years	Frequency	%

Below 5	2	10
5 to 10	0	0
10 to 15	1	5
15 to 20	1	5
20-25	3	14
above 25	14	67
Total	21	100

Time period of existing post		
Period in yrs	Frequency	%
Below 1	4	19
1to 5	12	57
5 to 10	0	0
10 to 15	2	10
15+	3	14
Total	21	100

What is your role on HRD in nursing?		
Responses	Frequ ency	%
As an Instructor her role is to produce quality nurses	12	33
Provide community health services	3	8
Human resource development	1	3
Expansion of nursing institute/colleges	2	6
Posting, recruitment, transfer, in-service education of nurses	1	3
Budgeting	1	3
Sixth-5 yr plan execution	1	3
Teaching staff development	2	6
Skilled human resource development	1	3
Arrangement of overseas training for nurses	2	6
Execution of revised curriculum (extension, expansion and newly establishment)	1	3
Arrangement of scholarship for nurses	1	3
Instructor development	1	3
Implementation of curriculum	1	3
Provide license/registration to the graduate nurses	1	3
Not relevant	2	6
During nursing training discuss how the quality of service can be improved	1	3
Non-response	2	6
Total	36	100
What is your future plan and activities?		
Responses	Frequ ency	%
To provide modern teaching following existing curriculum	4	12
Try to establish nursing as an acceptable profession in the society	3	9

Try to create adequate posts of nurses	1	3
Launching of BSc nursing	1	3
Sixth-5 yr plan execution	1	3
Teaching staff development	1	3
Skilled human resource development	1	3
Arrangement of overseas training for nurses	1	3
Execution of revised curriculum (extension, expansion and newly establishment)	1	3
Subject based Instructor development	1	3
Development of specialized nurses	1	3
Midwifery development plan	1	3
Preparation of junior mid-wifery course	1	3
Upgradation of 4 nursing institute in to basic college	1	3
Not relevant	7	21
Non-response	7	21
Total	33	100

What is your opinion about demand and supply of nurses in public sector?

Responses	Frequ ency	%
Supply is much more less than demand	15	58
Do not get interest as the payment is poor	1	4
In most of the government hospital there is no significant number of vacancy	1	4
Supply is ok need to create post	1	4
For general case nurse-patient ratio should be 1:3, but in special case 1:1	1	4
Currently 3741 nursing posts are vacant (sanctioned posts: 17183, posted 13442). For non-nursing posts 855 are working where sanctioned position is 1078 (vacant posts: 223)	1	4
Latest recruitment held in 2003	1	4
Around 8000 diploma nurses are unemployed, a significant number of them exceeded government service age	1	4
Number of vacant post is 2627	1	4
In day shift nurse and patient ratio is 1:13 it is more in evening shift	1	4
A significant number of registered nurses till remain unemployed	1	4
Not relevant	1	4
Total	26	100

What is your opinion about demand and supply of nurses in private sector?

Responses	Frequ ency	%
Supply is much more less than demand	15	65
Huge demand but insufficient recruitment	2	9
Do not get interest as the payment is poor	1	4
Attractive salary and facilities could solve the problem	1	4
Do not give appointment fulfilling the selection criteria	1	4
In private sector authority always does not like to appoint skilled/trained nurses	1	4

Demand is not significant	1	4
Non-response	1	4
Total	23	100

What are the reasons of the gaps? What are the solutions?

Reasons:

Responses	Frequency	%
The number of nurses produced in various institutes/colleges is not sufficient	6	22
New posts are not created	2	7
Health policy is not perfect	2	7
8500 nurses are unemployed	2	7
Delay promotion	2	7
Poor salary	2	7
Nurses are not treated as human being	2	7
For social barrier students do not get attraction	2	7
Lack of teaching staff	1	4
In private sectors nurses are low paid	1	4
Number of nurses produced per year is not adequate	1	4
Private hospital authority does not give emphasis on developing nurses rather than thinks to develop doctors	1	4
Nursing sector is neglected by private hospital authority	1	4
Lack of nursing institute	1	4
Non-response	1	4
Total	27	100

Solutions:

Responses	Frequency	%
New Nursing Institute (NI) to be established	4	17
Seat capacity of existing NI needs to be increased	2	9
More nurse to be recruited	2	9
Promotion should be given in due time	1	4
Attractive package of salary should be given	2	9
Management should be cooperative	1	4
In private sector more colleges for BSc nursing should be established	1	4
Require a guideline	1	4
Studies need to be commissioned for utilization of nursing staffs	1	4
Long working hour (8.00 pm to 8.00 am) in the hospital should reduce.	1	4
For quality teaching staff Masters in Nursing is essential	1	4
Created posts should be filled up immediately	1	4
New posts to be created	1	4
Now government recruitment is in process but not sufficient	1	4
In policy making representative from nurse is essential	1	4
Non-response	2	9
Total	23	100

Does the GOB have any plan to fill up the gaps? If yes, what is the plan?

Responses	Frequency	%
Yes	9	43
No	0	0
Non-response	12	57
Total	21	100
If yes, what is the plan?		
Responses	Frequency	%
Government has taken decision of establishing one NI in each district	6	38
Initiatives taken to improve social acceptance of nurses	1	6
Government has declared nurses second class officer	1	6
By 2011, 10000 nurses will be recruited	1	6
Initiative for sector wise study for HR has been taken	1	6
Formation of Task Force for Human Resource by the Government	1	6
3500 posts will be created	1	6
No response	4	25
Total	16	100

According to you how many nurses need to be graduated per year to meet up the gaps?

Responses	Frequency	%
More than five times of existing production	3	14
Near about four times of existing production	3	14
If nurse- doctor ratio is 3:1 then against 50000 doctors 150000 nurses will be required	2	10
Non-response	13	62
Total	21	100

Does the GOB have any plan to establish new nursing institutes in public and private sector? If yes, what is the plan?

Responses	Frequency	%
Yes	10	48
No	0	0
Non-response	11	52
Total	21	100

If yes, what is the plan?

Responses	Frequency	%
Government is planning to establish one NI in each district	8	67
Private Institutes are allowed to use public hospital	1	8
Government is planning to establish more NI in both public and private sector	1	8
After 2008 Government of Bangladesh established 12 nursing institutes	2	17
Total	12	100

What are the barriers in establishing nursing institute in public and private sector? How those can be overcome?

Responses	Frequency	%
Lack of skilled Instructors in both public and private sector	8	21
Lab facility is not modern	4	10
In private sector establishment of NI with lab facility is quite costly	5	13
Low social acceptance and delayed promotion	1	3
Study cost in private sector is very high	3	8
In private sector learning environment is not friendly	1	3
No adequate budget allocation for public sector	1	3
In private sector there is a lack of teacher, training instruments, house keeper and does not manage well	1	3
In public sector there is no perfect policy	1	3
It is very difficult to get approval from government to establish NI in private sector	3	8
For establishing NI full pleasant hospital is needed which is difficult for private entrepreneurs	2	5
No barrier exists there	3	8
Nursing Institutes are controlled by Health Ministry, not by Education Ministry	1	3
In private sector government ret'd. Personals are engaged as instructor	1	3
Collection of education materials is too tough in private sector	1	3
Rare involvement of media for highlighting nursing profession	1	3
Lack of interest from government side for establishing nursing institutes	2	5
Total	39	100

How to overcome the barriers?

Responses	Frequency	%
BNC should relax the registration policy	1	13
Modern instrument need to be provided	4	50

Private Entrepreneurs need to be linked up with Government Hospital	1	13
Coordination between Health ministry and Education ministry is essential	1	13
Government should provide financial assistance to the private sector	1	13
Total	8	100

Do you think that it requires any change in the policy?		
Responses	Frequency	%
Yes	12	57
No	6	29
Non-response	3	14
Total	21	100

If yes, what changes are required?		
Responses	Frequency	%
Initiatives are needed to produce skilled Instructors	1	3
Remuneration needs to be increased	2	7
Modern laboratory with modern instruments to be established	3	10
Private institute should be allowed to avail the facility as public institute	2	7
Private institute should be encouraged with providing loan/donation	5	17
Introduction of stipend for the students	3	10
Nurses produced from private institute should get chance of getting the job in public sector	1	3
Library should be established with adequate books	1	3
Uniform facility/system should be introduced for both public and private sector	2	7
From government level monitoring should be strengthened	2	7
BNC should provide with registration to the nurses who passed from the private institutes	1	3
For private sector NI required amount of land should be reduced	1	3
Instructors need to be posted	1	3
Standard roles and regulations should be introduced for both sectors	1	3
Nursing commission should be formed	1	3
In policy making representative from nurse should be included	2	7
Total	29	100

Does the existing curriculum both for graduate and diploma nurses require any revision to make it global standard? If yes, what type of revision is required?		
Responses	Frequency	%
Yes	7	33
No	10	48

Non-response	4	19
Total	21	100

If yes, what type of revision is required?		
Responses	Frequency	%
Curriculum should be reviewed following developed country other than Thailand and WHO	2	29
Curriculum should consider modern diseases	1	14
English language should be given importance	1	14
Curriculum should be revised through organizing workshops with different level stakeholders to make it global standard	1	14
Non-response	2	29
Total	7	100

Do you think that the existing teaching quality of nursing institutes is up to the global standard?

Responses	Frequency	%
Yes	9	43
No	10	48
Non-response	2	10
Total	21	100

- Due to lack of adequate learning materials existing curriculum could not be followed/ implemented properly.
- No library facility is available there where international journals could be found available.
- Poor lab facility (each institute needs at least 7 labs)
- Need of set teacher's criteria
- Teaching materials are required
- Shortage of teacher, weak monitoring and supervision

If no, how it could be developed?		
Responses	Frequency	%
Adequate number of modern equipment is required	1	8
Providing modern lab facility	3	23
Importance should given in English language	1	8
Science background students should be attracted providing various kinds of incentives	2	15
Instructors should be provided with high quality training from home/abroad	3	23
Salary and positions should be made more attractive	1	8
Instructors of private institutes should also be provided with high quality training from home/abroad	1	8
Meritorious students should be made attracted to nursing profession	1	8

Total	13	100
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How the public and private sector can collaborate in the development of nursing?		
Responses	Frequency	%
Both public and private sector should work with good coordination	4	16
Coordination among DNS, BNC, MohFW and private sector should work in joint collaboration	4	16
During planning joint initiatives of Ministry and DNS could give better result	1	4
Provision of exchanging students in public and private institute to be introduced	2	8
Students from private institute should be allowed to get the opportunity of performing her internship in government hospital.	2	8
In public sector nurses should be appointed from both public and private sector institutes through competitive exams	1	4
Effective monitoring needs to be provided from government level	1	4
Need relaxation of government rules for encouraging private sector	2	8
Teaching staffs might cover both public and private sectors	1	4
In revision/development of curriculum private sector should be entertained	1	4
Private institute should have link with government hospital	1	4
Public and private sector should follow same curriculum	2	8
Instructors (both public and private sector) should receive training on same contents	1	4
Non-response	2	8
Total	25	100

Growth of Resource Components of Health Systems

Applying regression technique to time-series data, the annual growth rate is calculated for a resource component as following where X_i is the i resource, t is time and E_i is annual addition of resource i to health system.

$$X_i = f(t)$$

$$E_i = \frac{dX_i}{dt} = \frac{d}{dt}f(t)$$

The growth rate of the resources is calculated using simple growth formula as following where g_i is growth rate in i resource; F and L are first and last value of the annual data series; and t is time.

$$g_i = \sqrt[t]{L/F} - 1$$

Table A-1 presents expansion equations, annual average addition and annual rate of growth of resource components during the period 1985 and 2005.

Table A- : Estimation of annual growth of health systems components in Bangladesh

Description of Variable	Equation	Average Addition to System	Growth Rate in the Resource
Doctors	$Doctor = 10226.3 + 1372.79t$	$d = 1372.79/year$	5.42
Registered Nurse	$Nurse = 4167.71 + 747.02t$	$n = 747.02/year$	5.87
Public Sector Hospital	$H_{public} = 579.87 + 4.68t$	$h_{pub} = 4.68/year$	0.59
Private Sector Hospital	$H_{private} = 10.79 + 37.27t$	$h_{prv} = 37.27/year$	9.49
Public Sector Hospital Beds	$B_{public} = 22454.50 + 578.91t$	$b_{pub} = 578.91/year$	2.12
Private Sector Hospital Beds	$B_{private} = 3234.81 + 499.43t$	$b_{prv} = 499.43/year$	6.27

**Estimation of demand for nurses for the period of 2006 – 2020
based on Population, Hospital Beds and Doctors**

Year	Population ⁴			Hospital Beds ⁵			Physicians / Doctors ⁶		
	Projected Population	Existing Country Ratio	World Bank Standard	Projected Hospital Beds	Existing Country ratio	Standard Ratio	Projected Doctors	Existing Country Ratio	Standard Ratio
2006	156346742	24390	31269	50877	22249	38158	44632	22316	178528
2007	159473677	24878	31895	52624	23013	39468	44632	22316	178528
2008	162663151	25375	32533	54450	23812	40837	50516	25258	202064
2009	165916414	25883	33183	56359	24647	42269	53254	26627	213016
2010	169234742	26401	33847	58356	25520	43767	56140	28070	224561
2011	172619437	26929	34524	60445	26434	45334	59183	29592	236733
2012	176071826	27467	35214	62633	27390	46975	62391	31195	249563
2013	179593262	28017	35919	64923	28392	48692	65772	32886	263090
2014	183185127	28577	36637	67323	29441	50492	69337	34669	277349
2015	186848830	29148	37370	69837	30541	52378	73095	36548	292382
2016	190585807	29731	38117	72473	31694	54355	77057	38529	308229
2017	194397523	30326	38880	75237	32903	56428	81234	40617	324935
2018	198285473	30933	39657	78137	34171	58603	85637	42818	342546
2019	202251183	31551	40450	81180	35501	60885	90278	45139	361112
2020	206296206	32182	41259	84374	36898	63281	95171	47586	380684

⁴ $\left(\frac{\text{population}}{10000}\right) \times (\text{required number of nurse})$

⁵ $(\text{number of beds} \times 3 \text{ shifts}) \div (\text{required number of nurses})$

⁶ $\text{Number of doctors} \times \text{Required number of nurses}$