RESEARCH ARTICLE

FORECASTING STUDENTS ENROLMENT AND TEACHER DEMAND IN SECONDARY SCHOOLS IN   KENYA BY 2012: A SURVEY OF   SELECTED SECONDARY SCHOOLS IN KENYA

Kyalo Benjamin Wambua* and Dr. Nyaga Jonah Kindiki

School of Education Management and Policy Studies, Department of Educational Studies, P.O. Box 3900- 30100, Eldoret, Kenya

ARTICLE INFO	ABSTRACT

The purpose of this study was to forecast secondary schools enrolment in the year 2012 and the number of teachers who would be required to teach the forecasted students. The study was based in Nandi North and South Districts in the Rift Valley Province, Kenya. The survey design employed by the study was the descriptive survey. Purposive sampling technique was employed in choosing the sample size for the study. The sample for the study was the Education Officers in charge of Statistics and the Teachers Service Commission Unit representatives at the District Education Offices. Staff in the records section at the Central Bureau of Statistics also participated in the study. The study was based on the Manpower Requirement Approach. Data for the study was collected by use of questionnaire, interview schedule and document analysis. Questionnaire and interview schedule were used to obtain information on teachers, students and secondary schools from the District Education Offices. Data on population of children who were between 1 to 4 years in 1999 was obtained from the Central Bureau of Statistics through document analysis. The findings indicated that the number of students expected to be in secondary schools in the year 2012 in Nandi North and South districts would be 30,080 and the number of teachers who would be required to teach them, based on the student-teacher ratio of 25:1, would be 1,203. In light of the findings of this study, it was recommended that the Teachers Service Commission should provide a solution to the anticipated shortage of 78 teachers by employing more teachers and distributing them to schools. It was also recommended that the government should enact a law to make the Free Primary School Education compulsory.

INTRODUCTION

The link between education and development has fairly been well established the world over. Education which is the principle agent for human resource development is widely accepted as a profitable investment in the World. Policy and decision makers, the world over, have for a long time been concerned with economic development of societies. The economic development of societies depends on human resource development which in turn depends on both the quantity and quality of education given to the nations (World Bank, 1980). Atkinson (1983) pointed out that for most goods and services; there is no need for government planning because market forces of demand and supply provide an efficient allocation of these goods and services. He argued that education is different because unlike goods and services whose prices convey information to the producer and consumer about their need and availability, such signal is

usually unclear in education and this may mean the available manpower may not match the requirements in the field. Therefore, there is need for planning in education because market forces are not operational as noted by Atkinson (1983) that:

... there is little alternative to planning education unless the existing system is radically changed. In most countries education is provided mainly by public authorities and is one of the largest industries. All large scale producers must plan for their future and the education industry is no exception. Indeed, since the time lags in 'producing' qualified people are so long, some kind of planning is even more essential (Atkinson, 1983: p. 69).

When Kenya attained independence in 1963, many colonialists vacated jobs and went back to their motherland. Most of the jobs that had been left required people with at least a primary education to fill the vacant places. This led to an increase in the demand for primary education.   When Free Primary

Corresponding author: Kurgatjoyce@yahoo.com

Education was declared in Kenya for the lower primary school level in 1974, the total enrolment that stood at 2.1 million rose steadily to reach 3.2 million in 1978. This progressive increase in primary school enrolment in turn affects secondary schools (Mutua and Namaswa, 1992). The increase in enrolment leads to high demand for manpower. Eshiwani (1993) observed that the greatest expansion realized in Kenya's education system has been at the secondary school level, because of the government's emphasis that this level should produce students who will be enrolled at institutions of training and also that it produces middle grade manpower. According to Silver (1983), the problem that has arisen is that there are insufficient numbers of qualified teachers to disseminate knowledge in our school systems and insufficient number of school inspectors to oversee the supervision of teachers. Republic of Kenya (2005) noted that teachers are important resources in the teaching and/or learning process and their training and utilization therefore, requires critical consideration. Poignant (1976) pointed out that projections on school enrolments at present enables educational planners and policy makers to foretell human resource needed in future-years. Therefore, to forecast the number of teachers needed in future the number of students to be taught should be known.

Statement of the Problem

Forecasting teacher demand is fundamental in provision of quality education if the country is to attain its Millennium Development Goals (MDGs). According to Collymore (2005), the Millennium Declaration in which world leaders (Kenya included) unanimously adopted at their September, 2000, United Nations (UN) Summit, represents a vision for improving the lives of the world's people. The UN agencies and other international organizations defined eight distinct Millennium Development Goals (MDGs) and attached to them, a series of quantifiable and time-bound targets and a set of indicators for tracking progress. One of the MDGs is that of attaining Universal Primary Education. The government's policy was to achieve UPE by the year 2005 with the overall goal of attaining Education for All (EFA) by 2015. In order to achieve this, planning for adequate number of teachers should be given a priority (Koech, 1999). According to Republic of Kenya (1996), it is observed that there is inadequate data for manpower planning. In addition there is no comprehensive system for monitoring human resource development trends. Hence there is no validation mechanism for comparing actual training performance with targets. Therefore, teacher shortage in Nandi North and Nandi South Districts just like in the whole country is occasioned by poor planning. According to records at the District Education Offices at both Nandi North and Nandi South districts there was persistent shortage of teachers and as a result the Pupil-Teacher Ratios were high for various secondary schools, this is as a result of poor planning and the quality of education offered has been affected by the high Student-Teacher Ratios. Thus there was need to prepare adequately for future enrolment by forecasting teacher requirement in both districts. This study investigated the demand for teachers in secondary schools in Nandi North and Nandi South Districts in the year 2012. This demand for teachers depends on the number of students in secondary school in the target year. The researcher made use of data from the past five years (2003-2007) to establish trends which were then used to forecast in the next five years (2008-2012). Five

year forecast was appropriate for this study because the period is enough to allow for the training and recruitment of teachers. The study intended to fill the gap by planning for manpower. This is achieved through forecasting teacher demand in the year 2012.

Objectives of the Study

The objectives for this study were:

- To establish the current number of teachers recruited in both Nandi North and Nandi South Districts.
- To determine the teacher wastage rate trend over the last five (5) years (2003- 2007) and to predict the number of teachers in the next five (5) years (2008 - 2012).
- To determine the trend of transition rate from primary to secondary schools over the last five (5) years (2003- 2007) and to predict the number of students who will be in secondary school in the next five (5) years (2008 -2012).
- To determine the students' wastage rate trend in primary and secondary schools over the last five years (2003- 2007) and to predict this rate in the districts in the next five (5) years (2008 -2012).
- To determine the current school establishment trend and to predict the number of secondary schools in Nandi North and Nandi South Districts in the next five (5) years (2008 -2012).

Theoretical Framework

The study was based on the Manpower Requirements Model. The overall framework of this model according to Thompson (1981) involves an analysis of the skilled manpower requirements of the economy from which a calculation may be made of the quantities, kinds and levels of education needed to meet these requirements. The approach attempts to provide the country with the correct number of suitably-educated people to meet most of its economic, social and political needs at different manpower levels. There are a number of methods of manpower forecasting; the earliest attempt was based on simple rule of thumb which was not based on evidence or analysis, but on judgment. More recently, countries have begun to rely on four other techniques: employers' estimate of future manpower requirements, international comparisons, extrapolation of fixed input - output ratios, and manpower – population ratios (Psacharopoulos and Woodhall, 1995). This study adopted the manpower - population ratios method of forecasting which concentrates on the ratio between one type of manpower and a particular parameter. The planning of education on the basis of manpower demand was the first of the manpower models to be developed and is still the one most frequently used. This approach has traditionally recommended the expansion of secondary and further education in order to increase skilled workers and professionals, but the problem arises when projections of these specialists needs are translated into educational requirements. For example, in Kenya today more emphasis is put on the Free Primary Education and the government is planning to provide Free Secondary Education as well; that means Kenya is on the path of expanding provision of primary and secondary education. Therefore in the next few years there will be more students at primary and secondary levels and more teachers will be

demanded to match the student ratios (Mutua and Namaswa, 1992).

Steps Involved in Manpower Requirements Approach

The following are the steps involved in the Manpower Requirements Approach, according to Psacharopoulos and Woodhall (1995).

a) Prepare an inventory of manpower for the current year, classifying the labour force by occupation, industry, education and age.
b) Estimate the total size of the available labour force for the target year.
c) Estimate the total employment in each branch of the economy for the target year.
d) For each of these branches allocate the total employment to various occupations.
e) Specify the education required for these various occupations.
f) Estimate the supply of people with various education qualifications based on present stocks, death and retirement.
g) Calculate the additional enrolments needed to meet the requirement.

The study made use of projection methods namely the Enrolment Ratio Method (ERM) and then the projection of teachers was based on the Pupil-Teacher Ratio Method (PTRM).

Enrolment Ratio Method

Enrolment Ratio Method uses demographic data and is based on enrolment ratio which is calculated on the basis of past data which is then extrapolated into the future by applying suitable mathematical technique or a specific logic. It is assumed that statistics on the projected population age-group is available alongside enrolment figures. The following steps are followed.

a) **Step 1:** Population projections are required to be worked out, if not readily available.
b) **Step 11:** Calculate enrolment ratio for the last five years.
c) **Step111**: Project enrolment ratios by method of least squares or any other suitable method or by logic assumptions.
d) **Step1V**: Obtain projected enrolment by taking the percentage of enrolment to projected population.

Projection of Teachers

According to UNESCO (2005) enrolment statistics form the basis for many investment decisions in education. A teacher is the most important academic input in education projections on teacher requirements.

Pupil-Teacher Ratio Method

This method involves calculations based on the Pupil-Teacher Ratio Formula.

$$T^t_s = \frac{E^t_s}{R^t_s}$$

Where:

T^t_s - Number of teachers at a particular time (t) for a particular school(s).

E^t_s – Enrolment at a particular time (t) for a particular school(s).

R^t_s – Teacher-Pupil Ratio at a particular time (t) for a particular school(s).

One of the basic assumptions of this method is that the number of students and not their class or form distribution is important. Manpower demanded to teach at the secondary school level requires planning so that the correct number is realized. This study intended to forecast teacher demand in the year 2012.

METHODOLOGY

This section gives a presentation of research design, area of study, target population, sample size and sampling procedures, data collection instruments, validity and reliability of research instruments, data collection procedures and data analysis procedure.

Research Design and Study Area

The research design adopted by the study was the descriptive survey design. The design was appropriate for the study since the research intended to make a specific prediction (forecast) concerning the number of students and teachers in the secondary school level in the year 2012 in both Nandi North and Nandi South Districts. The study was carried out in selected secondary schools in Kenya more so in the Rift Valley Province and specifically Nandi North and Nandi South Districts. Each district has two political constituencies. The district headquarters for Nandi North district is in Kapsabet whereas that of Nandi South is in Nandi Hills. The two districts are situated on the western part of the Rift Valley Province. Both districts cover an area of 27,894 square kilometres. The two districts were chosen for this study because the research, which intended to forecast the number of students who would be in secondary schools in the year 2012 and to determine the number of teachers required to teach the forecast students, would make use of the statistics from the National Population Census which was conducted in 1999 when Nandi district had not been split into North and South.

The children who were between 1 to 4 years in 1999 were expected to be in secondary schools in the year 2012 since in Kenya children are normally enrolled in standard one at the age of six (6) years and they go through the primary school curriculum in eight (8) years before proceeding to secondary school for four (4) years. The children who were born in 1998 will be fourteen (14) years old by 2012 and will be expected to be in form one whereas those who were four (4) years old in 1999 will be seventeen (17) years old in 2012 and would be expected to be in form four. Similarly those who were two and three years old in 1999 would be expected to be in form two and three respectively in 2012. The total population of the two districts in 1999 as per the National Population Census was 578,751. Those children who were between 1 to 4 years in 1999 were 72,320. Table 1 shows the number of children who were between 1 to 4 years in 1999 by gender.

Table 1: Number of Children between 1 to 4 years in 1999 by Gender

Age in years	Gender		TOTAL
	Male	Female	
1	8,151	7,954	16,105
2	9,562	9,350	18,912
3	9,539	9,501	19,040
4	9,125	9,138	18,263
TOTAL	36,377	35,943	72,320

Source: *Central Bureau of Statistics, Kapsabet*

Table 2: Number of Teachers and Employer

Employer	Number of teachers	Percentage (%)
TSC	944	90.33
BOG	101	9.67
TOTAL	1045	100

Source: District Education Offices. Nandi North and Nandi South.

Table 3: Forecast of the Number of Teachers from 2008 to 2012

Year	Increment (3.25%)	Number of Teachers	Wastage (1.70%)	Number of Teachers
2008	34	1079	18	1061
2009	34	1095	19	1076
2010	35	1111	19	1092
2011	35	1127	19	1108
2012	36	1144	19	1125

Table 4: Students Transition from Primary to Secondary School from 2002 to 2007

Year	Number of Students in Standard Eight	Year	Enrolment in Form One	Transition Rate
2002	13560	2003	4729	34.87
2003	13906	2004	5460	39.26
2004	15019	2005	5663	37.71
2005	14795	2006	6768	45.75
2006	14406	2007	7270	50.47

Source: District Education Offices. Nandi North and Nandi South.

The decision to choose the two districts among other districts in the country did not minimize the importance of other districts in the country as advocated by Taro (1970) that:

Table 5: Projecting Secondary School Enrolment to the year 2012

Year	Enrolment In Class One	10.99% Wastage	Year	Projected Enrolment in Class Eight	(41.61%) Transition	Year	Projected Enrolment in Form One	(8.60%) Wastage	Actual No. in Sec
2001	14463	1589	2008	12874	5357	2009	7517	646	6871
2002	14983	1647	2009	13336	5549	2010	7784	669	7115
2003	16925	1860	2010	15065	6269	2011	8796	756	8040
2004	15496	1703	2011	13793	5739	2012	8054	-	8054

Table 6: Forecasted Secondary School Teacher Demand in 2012

Year	Projected Enrolment	Student - Teacher Ratio	Projected Teacher Requirement
2012	30,080	25:1	1,203

From the central limit theories under certain conditions, the sum of independent random variables is asystematically normal, thus the sum will approach a normal distribution as the number of n of random variables that are summed become large. Similarly, in population of size N, the probability of choosing any one sample will be one out of N and this means that the chances of choosing any sample will tend to normality (Taro, 1970 cited in Kosgei 2001: p. 54).

Sample Size and Sampling Techniques

The staff at the District Education Office (D.E.O) and Central Bureau of Statistics (C.B.S) formed the target population for the study. The study set out to collect and analyze statistical information that would help policy makers in planning. The objectives of the study did not focus on factors that affect the number of students and teacher demand, hence two Education Officers in charge of Statistics and two Teachers Service Commission (TSC) unit representatives at the District Education Office in both districts together with the officers in the records department at the Central Bureau of Statistics (CBS) formed the sample for this study. The study adopted purposive sampling technique. Purposive sampling is a non-probability procedure that is limited to measurement, proof and generalization, but generalization is done to some extent and important lessons could be learnt from this study. Purposive sampling is a sampling technique that allows a researcher to use cases that have the required information with respect to the objectives of the study (Mugenda and Mugenda, 1999). The researcher purposively sampled the children who were between the ages of 1 and 4 in 1999 when the National Population Census was conducted. Two Education Officers in charge of Statistics and two T.S.C Unit representatives were also chosen because they had information that was relevant to this study.

Data Collection Methods

Data collection instruments for the study were questionnaire, interview schedule and document analysis

Questionnaire Method

The researcher designed questionnaire that was used to obtain relevant data from the respondents. Questionnaire with closed − ended and open-ended items dealing with teacher recruitment, teacher wastage, students' enrolment, transition, wastage and number of secondary schools were developed to collect data from the Education Officer in Charge of Statistics and the T.S.C representatives at the D.E.Os office. The questionnaire was designed in a way that the researcher was able to collect statistical data for the study.

Interview method

The researcher designed a semi–structured interview schedule with open–ended items that was used to obtain data on causes of teacher wastage, teacher shortage, reasons for the non-schooling gap and transition rate, causes of student wastage

and secondary school establishment. This data was obtained from the Education Officer in Charge of Statistics and the T.S.C unit representative at the District Education Office. The objective of the interview that was face–to–face was to solicit information that would supplement the information obtained through the questionnaire but it was not an in-depth study on factors affecting student numbers and teacher demand.

Document Analysis

The researcher requested the relevant authorities at the Central Bureau of Statistics (C.B.S) office to be allowed to analyze a written document which was the District Population Census records so as to obtain data on the number of children who were between 1 and 4 years in 1999. The analysis of the document was meant to enable the researcher to obtain statistical data for the study.

Data Collection Procedure

Data for the study was collected between the months of October and December 2007. The researcher administered the questionnaire to all the respondents, carried out interviews and analyzed relevant documents. The Education Officers in charge of Statistics and the TSC unit representatives were given sufficient time to respond to the questionnaire accurately after which the researcher personally collected the completed questionnaire. All the respondents were assured of confidentiality and that their responses would only be used for the purpose of the research.

Data Analysis Techniques

At the end of data collection, the data obtained from the Education Officers in charge of Statistics and the TSC unit representatives and data obtained from the Central Bureau of Statistics were examined critically by the researcher. Data analysis was done at two levels, the first level of data analysis involved coding of data manually. Data was organized to suit descriptive statistics, this organization entailed data conversion into percentages and averages. This was done in order to establish the situation as it was in the base year and also to establish a trend over the last five years which was then used in forecasting. The second level of data analysis involved forecasting enrolment into the target year and then determining teacher demand in that target year. Presentation and discussions of the results of the study is covered in chapter four.

Summary of Findings

The study set out to forecast the number of students who would be in secondary schools in the year 2012 and the number of teachers who would be required to teach the forecasted students. The summary of the study findings as per the objectives is given as follows: Table 2 shows the number of teachers currently working in secondary schools in both districts and their employer. The number of teachers at the secondary school level in the base year (2007) was 1045. However, contrary to the expectation that the government through the TSC is supposed to provide adequate teachers to all public schools, there were 101 (9.67%) teachers who were employed by the Board of Governors for various schools and 944 (90.33%) teachers were employees of the Teachers

Service Commission. This is an indication that the number of teachers provided by the government through the T.S.C is not adequate hence; the BOG had to come in to avert the shortage by employing more teachers. The T.S.C should therefore employ enough teachers and distribute them according to demand. The study found out that an average of 1.70% teachers leave the profession annually. These teachers either retire upon attaining the age of fifty–five (55) years or other causes of attrition lead to their wastage. Causes of attrition that were identified by the study included death, sickness, interdiction and dismissal by the Teachers' Service Commission and poor career choices which in the end lead to teachers opting out so as to join professions of their preference. Despite the fact that a number of teachers opt out of the profession each year, there are also other people who join the profession. The number of new entrants (3.25% per year) is on average higher than the number of teachers that move out therefore, the net effect is that there is an annual increase in the number of teachers. If the current rate of wastage and increment remains constant, the number of teachers who are expected to be in service by the target year (2012) is 1,125 as shown on Table 3. Table 4 indicates the transition rate of students from primary to secondary school from the year 2002 to 2007. The transition rate from primary to secondary schools was found to be 41.61% which according to Republic of Kenya (2004) is slightly below the national transition rate which stood at 43%. Reasons that were given for the low transition rate included the poverty levels of the people, performance in the Kenya Certificate of Primary Education (K.C.P.E) which is below average, the limited secondary school places, and the retrogressive socio-cultural practices of the residents, orphans, disability and ignorance. The number of students expected to be in secondary schools in the target year is 30,080. A number of students who initially enrolled in the formal school system fail to go through the system in the expected time because they either repeat or drop out. The wastage rate at the primary school level was established at 10.99% whereas wastage at the secondary school level was 8.60%. Causes of wastage were identified as financial constraints due to the poverty levels of the people, sickness and death, students' academic performance and pregnancy and early marriages. There were a total of 145 secondary schools in the two districts in the base year. Secondary schools kept increasing at an average of 10.37% per year. The number of secondary schools expected in the target year is 237 (Table 5). The number of students who are expected to be in secondary schools in the year 2012 is 30,080 and the number of teachers demanded will be 1,203 as shown on Table 6. If the current trend of teacher recruitment, wastage and increase continues then the total number of teachers who would be in service in the year 2012 is 1,125. Therefore, there will be a teacher deficit of 78 teachers and so the government through the Teachers' Service Commission should make efforts to avert this anticipated deficit.

Recommendations

The following are viewed as some of the ways of ensuring that there are adequate teachers to match the ratios of students to be taught. These are not, however, panacea for all the problems of teacher shortage in secondary schools.

1. In order to ensure that as many teachers as possible are retained in the teaching profession, there is need

to improve on remuneration. The remuneration should be commensurate to the amount of work that teachers perform.

2. Teachers should be given chances to further their education and be motivated through promotion upon achievement of higher academic levels. Therefore, the Teachers Service Commission should review some rules on teachers who are given study leave. For instance the rule that a teacher who takes a paid study leave should not be promoted for at least two years after the study leave.

3. The Teachers Service Commission (TSC) working closely with the Ministry of Education (MOE) to employ more teachers, and equitably redistribute and balance teachers of varying competencies.

4. To reduce teacher wastage due to poor career choices, secondary school teacher training institutions like universities should only admit those who selected teaching as the first choice in their lists of career choices.

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