



ADVANCED
SOCIAL
TECHNOLOGIES

COST EFFECTIVENESS ANALYSIS

***STRENGTHENING INSTITUTIONS TO IMPROVE PUBLIC
EXPENDITURE ACCOUNTABILITY***

PROJECT

ADVANCED SOCIAL TECHNOLOGIES

NON-GOVERNMENTAL ORGANIZATION

Armenia

2011

COST EFFECTIVENESS ANALYSIS

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EDUCATION

Literature review

The review of available literature on Cost Effectiveness Analysis in Education shows that the cost effectiveness analysis was developed and started to be used in early 1960's, whereas until 2000's there were very few attempts to conduct such analysis for evaluation of different policy options in education field¹. Three main reasons were considered to address the following: (1) lack of apparent capacity and training; (2) lack of effectiveness results that can be relied upon; and lack of demand by policymakers. And the latter was the most essential one. Despite the fact that education expenditures account for one of the largest percentages in the Government Budgets, usually insufficient attention to policy and strategy is devoted when allocating or analyzing education expenditures.

Henry Levin, one of the well-known analysts in the field of Cost-effectiveness analysis in education, defines CEA as a method for combining appropriate measures of outcomes with costs so that program and policy alternatives can be ranked according to their effectiveness relative to resource use. Presumably the alternatives with the least cost relative to their results (or best results relative to costs) are the ones that are most attractive for adoption.

However, the application of the CEA in real life is not as easy as the definitions might sound. First of all, a clear definition of the problem or objective must be formulated. Then relevant policy interventions should be considered and listed for achieving the objective (and surprisingly some of cost-effective interventions could be not from the field of education). Then appropriate effectiveness measures are chosen that would best describe the interventions. Usually, educational effectiveness is measured in terms of achievement gains per student or some other per student measure. The next step is proper calculation or estimation of costs associated with each alternative intervention, including identification of resources or ingredients, their valuation or measurement, and estimation of total (per student) costs of interventions. Once the costs are measured, cost-effectiveness ratios are calculated to compare different interventions.

Brief background information on the programs

Basic CEA

Basic CEA conducted in this report compared vocational education and higher education in terms of the number of graduates and their unit costs. The effect measure is defined in the form of expected future income level for beneficiaries of each education level.

¹ Henry M. Levin, "Waiting for Godot: Cost-Effectiveness Analysis in Education", NEW DIRECTIONS FOR EVALUATION, no. 90, Summer 2001

Table 1. Basic CEA

<i>in thousands of AMD²</i>	Number of graduates	Average number of study years	Annual cost of study	Per-graduate cost of study	Total cost of study	Expected annual income
<u>Initial Professional and Middle Professional Vocational Education</u>	2,718	2.6	264.9	687.2	1,867,862.9	1,024.0
1. Initial Professional Vocational Education	1,103	2.0	688.4	1,376.8	1,518,557.7	960.6
2. Middle Professional Vocational Education	1,615	3.0	181.9	545.8	881,397.0	1,067.3
<u>Higher Education</u>	28,678	4.1	310.2	1,272.8	36,499,956.4	1,389.5
1. Higher (Undergraduate and Graduate) Professional Education	28,255	4.1	300.7	1,238.7	34,999,597.9	1,387.5
2. Post-Graduate Professional Education	423	3.0	479.8	1,439.5	608,888.9	1,526.2

Data in the table are for 2008. The source for the number of graduates is “Social condition of Armenia in 2008” of the Statistical Service of Armenia. Data on annual cost of study are from BIA report produced by AST last year. The source for the expected annual income for 2008 is “Social and economic condition of Armenia in 2008” of the Statistical Service of Armenia. Average annual 2008 salary for Armenia was used for middle professional vocational education, 90% coefficient out of this figure was applied for initial professional vocational education, 130% coefficient was applied for higher (undergraduate and graduate) professional education and 143% coefficient – for post-graduate professional education. These coefficients were derived from “Sample survey of labor and non-formal employment” carried out by the Statistical Service of Armenia in 2008.

As the table shows, the time necessary to cover the total cost is about 8 months for vocational education and about 11 months for higher education. Furthermore, the difference in expected annual income of higher education graduates and vocational education graduates is 365.6 thousand AMD, whereas the difference in total costs for higher education graduates and vocational education graduates is 585.5 thousand AMD. This implies that it would take only 1.6 year from the higher education graduate to cover the difference in the total costs.

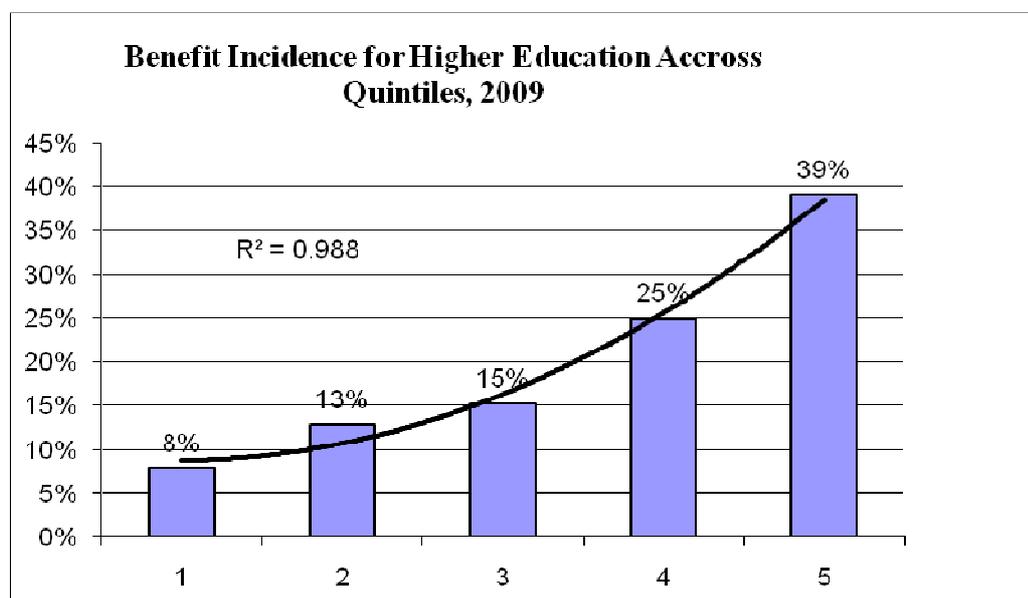
All these assumptions and analyses do not take into account the unemployment rates among graduates, however, still provide a basis for comparing the “effect” of each level of education relative to its costs. This analysis can be extended out of framework of basic CEA and involve such factors as “wealth level at university entry level vs. graduation” and correlating that with expected income level, etc.

² Current AMD/USD rate is around 360 AMD per 1 USD

Program CEA

Scope of the Analysis: establishment of separately operating high schools' network, revision of the mechanism of state subsidies and introduction of student loans in terms of more equitable distribution of Government spending on higher education among different income level groups (quintiles) of population.

The Benefit Incidence Analysis for Armenian education system conducted recently revealed a highly inequitable distribution of government subsidies in higher education among income quintiles of the population. The poorest quintile received about 8% of those subsidies, whereas the richest quintile received about 40% of them.



This trend represents unequal opportunities for poor and rich to get better prepared for entering universities, as well as lack of pro-poor state policy in allocation of state subsidies for higher education.

This phenomenon is assumed to be a combined result of:

- poor quality of education in higher grades (10-12) of general secondary schools (schools that provide general education from 1 to 12 grades, which is currently the largest portion of schools in Armenia), especially in rural areas,
- lack of equitable distribution mechanisms in distribution of government allowances to university students,
- absence of alternative sources of financing for students from low income families.

This pattern in Higher Education is explained easily and some disparities of similar nature exist in most countries but the in Armenian case it is way too extreme from social perspective. This is the area where the

government authorities must be concerned about vicious cycle created by the system for poor to remain poor.

Description of Programs

High School Program

Poor quality of education in higher grades of general secondary schools especially in rural areas brings to a larger gap between students from poorer and richer families in terms of the level of preparedness to successfully pass university entrance exams and get state allowances or scholarships for higher education. This is because richer families can afford hiring private tutors to prepare their children for university exams, whereas the poorer families more often cannot do that.

In order to improve the quality of education in higher grades of general education, Armenian Government decided to establish a network of separately operating high schools by selecting about 150-200 general secondary schools throughout the country, leaving there only the higher grades (10-12) and transforming all remaining secondary school into basic ones (for grades 1 to 9). This process assumes massive investments in the facilities of those high schools, new textbooks, new curricula, teacher trainings and attestations, as well as differentiated financing of recurrent costs of those schools. The small and very remote villages with only 1 school will keep their general secondary schools (1-12 grades). The results of 2009 university entrance exams showed, that about 64% of newly established high schools applied to universities and about 58% were admitted, whereas the same indicators for the whole country were about 41% and 28% respectively. Therefore, from this perspective, the different status of high school and 10-12 grades of general secondary schools becomes an important factor affecting the ability of the poor students entering high education institutions.

State Allowance for University Students

The current mechanism of state allowances for higher education is mostly merit-based, i.e. the allowances are granted to the applicants with the best results in entrance exams. Furthermore, the government decides on the number of grantees per each specialty for each state university prior to the entrance exams. One of the main improvements in this mechanism was introduction of rotation principle in the higher grades of university study: the allowances now migrate from the students with lower performance to the students with the best performance, based on annual results of exams.

However, the current merit-based state allowance system does not take into account the real need in that allowance for the recipient's family, resulting in dropouts from universities because of financial reasons. Those dropouts can be categorized into 3 types: (i) those that quit universities during their study because of inability to pay their tuition fees, (ii) those that are being admitted to universities, but are not granted with state allowance and cannot find resources even for the first year tuition fee, and (iii) those that decide not to apply to universities because of lack of resources and hope that they will receive state allowance. Thus

there is a need to review that system to include a factor for the level of family income both in the stage of university entrance and in the rotation mechanism.

State Program for Student Loans

There is a lack of financing sources for university study other than parental payments of fees and state allowances. Some Armenian commercial banks provide loans for students, but these are closer to consumer loans with high interest rates and other terms not affordable for lower income families.

To fill the gap of affordable alternative financing source for higher education costs, including tuition fees and other learning expenditures an introduction of a student loan scheme could be considered, that would target those really interested in the learning process and having a real need of alternative financing.

All three policy interventions target the same objective of decreasing the dependence of high education beneficiaries from their poverty level. It is not possible to eliminate such dependence fully, however, the current disparity between the quintiles is very dramatic and some improvement must and can be achieved.

Description of cost data

High School Program

The following data were used for calculating High School Program cost:

1. For capital costs actual costs for 2008 and 2009 were analyzed from the following sources:
 - a. First Education Quality and Relevance Project financed by the World Bank;
 - b. State Budget of Armenia;
 - c. Textbook Revolving Fund.
2. The following breakdown of the capital costs was used:
 - a. School furniture and equipment;
 - b. Library literature;
 - c. Textbooks and other learning materials;
 - d. Renovation of high schools buildings;
 - e. Training of high schools teachers.

The categories c. and e. were treated as capital expenditure since the textbooks are used in schools for 4-5 years, and the teachers will be trained once for 5 years.
3. For the assessment of recurrent costs coefficients of school per capita funding formula were used that were adopted by the joint decree of Minister of Finance and Minister of Education for 2009.
4. Cost data for High School level of General Education were taken from Program Budgeting and Benefit Incidence Analyses.

State Allowance for University Students

Costs for State Allowance program represent planned technical assistance costs for development of a new framework of Higher Education financing to be conducted under donor-financing.

State Program for Student Loans

Costs for State Student Loan Program consist of two cost types:

1. technical assistance costs for development and piloting of a student loan system, being conducted under donor financing;
2. annual cost of loan repayment for a loan taking student, assessed by a student loan scheme cash flow.

Methodology of how costs were calculated or estimated

High School Program

The costing of High School Program was conducted through the following methodology:

1. Actual capital costs for 2008 and 2009 were collected for the above mentioned sources and categories, totals for all sources and categories were calculated;
2. Unit costs per cost categories were calculated, using the number of established high schools for 2008 and 2009 (37 schools), these costs were extrapolated to the maximum planned number of high schools (200 schools);
3. Existing school financing formula was used for assessment of recurrent costs of 200 high schools to be established: $Y = A + BN$, where Y is the annual amount of school financing, A is the school coefficient, B is the per-student coefficient and N is the number of students. For the new high schools the Government introduced a new coefficient (1.1), that is multiplied to the per-student coefficient;
4. Assuming, that all of 200 high schools will be established during 2008-2012 period (5 years), the total recurrent and capital costs were assessed for each year and for the whole period, as well as annual average costs were estimated;
5. Using PBA and BIA data, recurrent and capital costs for the same period and the number of schools were calculated for the baseline case (for the case of no intervention), difference of the annual average intervention costs and annual average baseline costs was considered as the additional annual cost associated with the proposed intervention.

State Allowance for University Students

The costing of State Allowance Program was conducted through the following methodology:

1. For the technical assistance for development of a new framework of Higher Education financing to be conducted under the Second EQ&R Project one international and 2 national experts will be hired for 1 year, and the proposed costs will cover their remuneration and costs related to the travel and

- accommodation of the international consultant, as well as funds for translation of developed materials;
2. A few other costs were included in the estimation, such as organization of seminars for discussion of the new financing framework, sector survey for needs assessment and legal expertise for reviewing the legal enabling environment and proposing appropriate changes to the current legislation;
 3. A 5-year period was considered for amortization of the proposed investment and one-fifth of the cost was used as annual cost of the intervention.

State Program for Student Loans

The costing of State Allowance Student Loan Program was conducted through the following methodology:

1. For the technical assistance for development and piloting of a student loan scheme, being conducted under the Second EQ&R Project, one international expert was hired for 2 years and 3 national experts will be hired for 4 years, and the proposed costs will cover their remuneration and costs related to the travel and accommodation of the international consultant, as well as funds for translation of developed materials;
2. A few other costs were included in the estimation, such as organization of seminars for discussion of the new financing framework, a study tour for 4 specialists, a sector survey for needs assessment and a legal expertise for reviewing the legal enabling environment and proposing appropriate changes to the current legislation;
3. A 5-year period was considered for amortization of the proposed investment and one-fifth of the cost was used for estimating the annual cost of the intervention;
4. The annual cost of loan repayment for a loan taking student was considered, that was assessed by a student loan scheme cash flow;
5. The annual cost estimates described in the points 3 and 4 were summed to measure the total annual cost of the State Student Loan Program;

Description of Effectiveness Data

High School Program

The following data were used for estimating the effectiveness of High School Program:

1. Data on 2009 university entrance exam results for first 10 high schools from Shirak, Sunik, Gegharkunik, Aragatsotn marzes (regions) and the capital city Yerevan, including the number of graduates, the number of applicants to the universities and the number of entrants to universities, collected from the schools through a small questioning;
2. The same data on 2009 university entrance exam results for all schools from the same regions, received from the Assessment and Testing Center, responsible agency for organization and conducting of the exams.

State Allowance for University Students

The following data were used for estimating the effectiveness of High School Program:

1. Data on the annual number of applicants and students not able to start and/or continue their study in university because of inability to pay university fees. Data were received from the Ministry of Education and Science.

State Program for Student Loans

The following data were used for estimating the effectiveness of State Student Loan Program:

1. The number of loan recipients for the first year of operation was taken from the demand assessment presented in Baseline Study Report on “High schools-to-higher education institutions transition” conducted in July-October 2009 by International Accountancy Training Center in the framework of Education Quality and Relevance Project.
2. Percent changes in the annual numbers of recipients for the next years are based on the assumptions developed by the Student Loan Development Team.

Methodology of how effectiveness was measured or estimated

High School Program

The effectiveness assessment for High School Program was conducted through the following methodology:

1. Percent of applicants and admitted students was calculated against the number of graduates per each newly established high school, per subtotal of new high schools in each marz, for marzes and for the whole Armenia;
2. Estimated additional number of university applicants and entrants were calculated for the case of complete coverage of the country by newly established high schools, and this measure was considered as the measurement of effectiveness for this policy intervention.

State Allowance for University Students

The effectiveness assessment for State Allowance to University Students Program was conducted through the following methodology:

1. The actual annual number of applicants and students not able to start and/or continue their study in university because of inability to pay university fees was considered as the effectiveness measurement for this policy intervention, assuming that these individuals are the priority target group for the intervention.

State Program for Student Loans

The effectiveness assessment for Student Loan Program was conducted through the following methodology:

1. Annual average estimated number of loan recipients for the first 5 years of operation was considered as the effectiveness measurement for this policy intervention, assuming the number of the first year participants and percent changes for the next years come true.
2. The below table presents the main assumptions for the proposed SL model.

Table 2. Assumptions made in the model for Students Loan option

Involvement of students in the loan system	
First year number of loan recipients	700
Annual percent increase in the number of recipients	5%
First year dropout rate from the loan program	10%
Second year dropout rate from the loan program	5%
Third year dropout rate from the loan program	2%
Loan terms	
Average size of annual loan amount provided to a student, in USD	\$ 3,000
Length of study, in years	4
Annual interest rate	5%
Loan repayment period, in years	10
grace period, in years	1
Cost of funds to be raised by the Government, including administrative costs	3%
Loan repayment	
Repayment rate	95%
Repayment rate for first year dropouts	90%
Repayment rate for second year dropouts	85%
Repayment rate for third year dropouts	80%

Summary Description of Options/Programs Compared

The table below presents summary information on the programs, their objectives, costs, and effectiveness measures.

Table 3. Summary of policy options

Programs	Objective(s) of Program	Total Costs, in 000 AMD	Cost Data	Effectiveness Measure	“Effect” Variable
A. Effective and accessible high school system	Improve readiness of applicants from poorer families for university entrance and study	2,351,428	PBA, BIA, other	Number of additional students from poorer families	More equal distribution of Government subsidies for higher education
B. Introduction of a needs-based state allowance system	Increase access for state allowance for university to the applicants and students from poorer families	14,411	PBA, BIA, other	Number of additional students from poorer families	More equal distribution of Government subsidies for higher education
C. Introduction of a student loan system	Provide additional and affordable financing to those in need and with strong motivation to study	1,305,666	PBA, BIA, other	Number of additional students from poorer families	More equal distribution of Government subsidies for higher education

As the table shows, the general objective of all 3 programs is to improve the access for applicants and students accessing high education without direct dependence on poverty level. The effectiveness measure for all 3 programs is the same: number of additional students from poorer families (with a proxy in the first option). However the programs differ in terms of area of activity, coverage and financial implications.

CE Ratio Results

The table below presents summary information on the results of CE analysis – quantitative measure of the program coverage, total costs and savings, as well as CE ratios for the proposed programs.

Table 4. Policy options and main economic parameters for those

Policy options	Coverage/ Beneficiaries	Total Cost of intervention, thousands of AMD	Savings, thousands of AMD	Net cost of intervention, thousands of AMD	C/E ratio, thousands of AMD
Option 1: Establishment of high schools network (60000 pupils overall)	5,153	10,013,420	7,661,991	2,351,428	456
Option 2: Revision of HE financing mechanisms	100	14,411	0	14,411	144
Option 3: Development and introduction of student loan scheme	1,934	1,305,666	0	1,305,666	675

Brief preliminary discussion of results

As the above table shows, Option 2 has the lowest C/E ratio; however, it also has the smallest coverage of beneficiaries. The number of dropouts from universities due to financial problems is fairly small. Option 3 is much larger in coverage, but also is much more expensive, since it includes the loan repayment cost to be born by students.

Option 1 has the largest coverage among beneficiaries and is in the middle in terms of C/E ratio. Thus it could be treated as the most effective tool for increasing the access of poor to higher education. However, that does not imply that all resources could be directed to this option, since the assessed coverage is supposed to be at its maximum possible level because of the natural limit of the number of high school-aged population.

Rather, the combined effect of all 3 options could be treated as the most effective way to increase the access of poor to higher education, thus resulting in more fair distribution of government subsidies on

higher education among income quintiles, especially when taking into account the fact, that the Government has already committed resources and efforts for implementation of all 3 programs.

Plans for extensions or modifications in the next draft

In case a new survey is conducted among newly established 37 high schools that provided graduates for 2010 university entrance exams then this report may adjust the data with a more recent and wider coverage school and exam data. This would also enable comparing the exam results for 10 schools already analyzed in the scope of 2009 exams.

Also a market survey on Student loan demand could provide updated data on proposed participation in this program, as well as test the SL model's assumptions on larger samples. In case those surveys take place, our assumptions will be better grounded or will need to be adjusted to reflect the findings of such surveys.

At last, the impact of increase access could be assessed for each income quintile, and a new proposed distribution of benefit incidence could be conducted as a benchmark for the desired outcome of planned interventions.

HEALTH

Brief background information on the programs

Cost effectiveness analyses for health sector were focused on Ambulatory-policlinic obstetrical-gynecological medical care for pregnant women program. Selection of this program was based on Government's health policy priority. At the same time improvement of maternal health care is the one target point of the Millennium Development Goals which includes:

- Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio (Maternal mortality ratio, Proportion of births attended by skilled health personnel)
- Achieve, by 2015, universal access to reproductive health (Contraceptive prevalence rate, Adolescent birth rate, Antenatal care coverage (at least one visit and at least four visits), Unmet need for family planning)

Reproductive and maternal health care in Armenia is implemented through an extensive system of ambulatory policlinics and hospitals. The network of ambulatory health care is organized around geographical regions and is offered through women's consultation policlinics and rural health facilities. Obstetric care is offered at hospital obstetric-gynecological departments, regional delivery hospitals located in urban areas, and at republican centers for specialized (tertiary) care.

Data used for the study are taken from public sources, several related reports and expert discussions: annual state budget laws, MTEF³, ADHS⁴-2005, donor organizations reports and AST survey-2009 data's.

The health care that a future mother receives during pregnancy and at the time of delivery is important for the survival and well-being of both the mother and the child. Antenatal care (ANC) is described according to the type of provider, number of ANC visits, stage of pregnancy at the time of the visits, and number of visits, as well as the services and information provided during ANC.

According to ADHS-2005 93% of women who had a live birth in the five years preceding the survey received antenatal care at least once from a doctor (90%) or a nurse or trained midwife (3 %). In urban areas, 94% of women received care by doctors and 2% was provided by nurses or trained midwives. In rural areas, 83% of women received antenatal care from a doctor and 6% from a nurse or a midwife.

In almost all regions, at least nine out of ten mothers received antenatal care from a trained professional. However, antenatal care from a health professional (doctor, nurse, or midwife) is received by only 78% of mothers in Shirak region and 74% in Gegharkunik region⁵.

³ MTEF – Medium-Term Expenditure Framework is a three-year budget planning document with program strategies and fiscal parameters.

⁴ ADHS – Armenia Demographic and Health Survey

In the five years since the 2000 ADHS, a significant change has taken place in the coverage of antenatal care by a doctor has increased from 84% to 90%, while care by a nurse or a midwife decreased from 9% to 3%.

Based on ADHS 2005 71% of women who had a live birth in the five years preceding the survey made four or more antenatal care visits for their most recent birth. There is a significant variation between urban and rural areas. The percentage of women who make four or more antenatal care visits in rural areas is much lower than that in urban areas (53% compared with 82%).

In general, urban women appear to make their first ANC visits earlier than rural women. More than half of urban women (51%) have their first antenatal visits in the first four months of pregnancy, compared with 43% of rural women. In the content of ANC, signs of pregnancy complications are identified in 50.7% for urban area and only 38.2% for rural.

The Government policy and the activities in the sector are presented in the following documents: Mother and Child health care strategy for 2003-2015, National program on improvement of reproductive care for 2007-2015, Government's Annual Activities Plan, 2009-2011 Medium-Term Expenditure Framework (MTEF), Poverty Reduction Strategy Paper 2008 (PRSP), government decisions and other sectoral documents.

According to the 2009-2011 MTEF the more relevant objectives for mother's health care programs are the following:

- To increase accessibility of obstetrical services, decreasing maternal mortality at least by 20%.
- To improve quality of pregnant women's prenatal services, increasing of pregnancy identification indicator by 30%.

In the above document and also National Program in Improving the Reproductive Care the improvement of antenatal services to women are identified as priority.

There are also foreign donor projects that are contributing maternal health care directly or in a context of the projects. Two of them is described below:

Maternal and Child Health Improvement Project (NOVA 2/USAID): The main goal of NOVA 2 is to assist the Government of Armenia in its efforts to address remaining challenges and advance the quality of maternal and child health, reproductive health and family planning services. The project will achieve this by enhancing the knowledge and skills of practicing healthcare providers, improving the physical infrastructure of healthcare facilities, institutionalizing the quality assurance system, strengthening overall management and supervision, as well as educating and mobilizing rural and semi-rural communities for prevention and appropriate care-seeking practices.

Primary Healthcare Reform (PHCR/USAID) Project: This activity supports the GOAM/Ministry of Health to introduce primary healthcare (PHC) reform and increase the utilization of sustainable, high-quality primary healthcare services in Armenia. The project has six components: (1) health care reform and policy support (including renovation and equipment of facilities), (2) open enrollment, whereby every resident of Armenia

⁵ These are 2 regions out of ten in the country

has a right to choose his/her own healthcare provider, (3) family medicine, (4) healthcare finance, (5) public health education, and (6) quality assurance. The project will be expanded until the entire country is covered.

Description of cost data

The Government finances health programs (under state health budget financing) for pregnant women with an aim for them to receive out-patient obstetrical-gynecological consultations and laboratory and medical equipment analyses as much as required. The above program is one of the most important one and budget allocations per beneficiary also reflect this. The prioritization of the program is evidenced in the table below with more than double increase of financial allocations in the period from 2006 to 2010 for the pregnancy relevant care programs while all other programs had increase at a much lower pace.

Table 5. State budget healthcare programs

<i>In thousands of AMD</i>	2006	2007	2008	2009 (budgeted)	2010 (estimated)
Public health primary (ambulatory-polyclinic)care services	13,336,353	15,606,114	18,280,513	24,106,798	19,861,476
Services of obstetrical-gynecological medical assistance	3,015,199	3,266,005	5,108,887	8,167,484	7,228,845
Hospital medical aid services	12,604,188	13,941,868	14,889,779	16,796,179	15,141,589
Public health services	1,934,555	2,921,995	2,829,200	3,038,393	2,796,361
Paramedical services and other supportive services	7,789,352	10,073,645	12,454,542	12,835,470	9,065,701
Policy Formulation and Administration	730,537	844,105	910,534	1,143,287	1,080,977

The table below presents the summary data on comparative share of the state and households in healthcare expenditures by programs identified in this report. Unfortunately the data is available only for 2008 (as a result of our own survey – no external source was available to have a dynamic picture). However, even for this one year it noticeable that the state has a major role in provision of health services almost in all programs, especially for Primary healthcare and Obstetrical-gynecological services, where the government has announced a priority support.

Table 6. Healthcare programs by financing source, 2008

<i>in thousands of AMD</i>	Expenditures			% to total	
	State	HH	Total	State	HH
Public health primary care services	18,280,513	9,587,080	27,867,593	66%	34%
Services of obstetrical-gynecological medical assistance	5,108,887	1,371,330	6,480,217	79%	21%

<i>in thousands of AMD</i>	Expenditures			% to total	
	State	HH	Total	State	HH
Hospital medical aid services	14,889,779	17,179,516	32,069,295	46%	54%
Public health services	2,829,200	2,139,454	4,968,654	57%	43%
Paramedical services and other supportive services	12,454,542	297,146	12,751,688	98%	2%
Policy Formulation and Administration	910,534	-	910,534	100%	0%
TOTAL	54,473,455	30,574,527	85,047,982	64%	36%

For the purpose of the cost-effectiveness of the current policy approach this report has presented additional three policy options that can be considered during the policy debate on the improvements in the current policy.

Hence, four in total options (including the status quo) have been analyzed and costing information for those has been identified. All options refer to the rural area pregnant women as those are identified as the highest risk of improper antenatal service level beneficiaries. All new policy options have the same general objective of increasing the access of rural area pregnant women for antenatal services.

1. Option 1: Status quo, with minor financial efficiency improvements suggested
2. Option 2: Compensation for transport expenses for women to reach regional out-patient facilities in order to receive qualified services
3. Option 3: Specialized personnel visits at home from regional out-patient facilities to communities in order to make qualified services accessible
4. Creation of a specialized mobile service for visiting the rural communities in order to provide high quality services.

Costing information for the first option is based on the state budget information on costs for this program. The actual number of visits was used to identify the level for possible savings.

For the new policy options, we have identified policy intervention model for each option and calculated costs using a mix of existing data and assumptions on service utilization level.

Methodology of how costs were calculated or estimated

Options are compared on the basis of their total cost impact on the government budget and the estimates are calculated based on:

- Estimated current average visits,
- actual payments – government allocations for the services
- expected recurrent and capital expenses
- Numbers of service's visits.

The government statistic doesn't show actual number of pregnant visits to obstetrical-gynecological consultations but experts' estimations and surveys provide some information on that. For example the report by "Armavir development centre" NGO's on "Evaluation of implementation state certificates system" in 2009 has shown that pre-delivery visits in rural areas are around 40% less than in urban areas. The ADHS-2005 also provides similar information.

There is no in-country assessment on level of correlation of low number of pre-delivery consultation visits with the performance of child mortality and disease indicators however it is obvious that unsatisfactory control of pregnant women increases the risk of pathologies of late diagnostics, laboratory exams and medical aid. Thus, the outcome of the policy options is not quantified in this report due to the lack of relevant empirical data but the positive correlation between the quantity/quality of antenatal services with the child delivery and healthcare indicators is indisputable.

Description of Effectiveness Data

1. Option 1: Status Quo adjustments

Nothing is changed and the Government continues implementation of existing program on obstetrical- gynecological ambulatory-polclinic services. However, the savings can be made as the government purchases services for all pregnant women in the country while many of those in fact do not receive the service (due to access or any other reason). In any case, the government can introduce a more directly linked system that records the actual number of visits and compensates the funds to hospitals only for actual visits (vs. currently used total registered number of pregnant women in that specific region covered by a particular hospital). Hence, some non-vital but still noticeable savings can be made

2. Option 2: Compensation for transport

Women are receiving subsidies for transportation fees to reach regional medical centers in order to make out-patient services accessible for women from rural locations.

Calculated cost and number of visits from communities to regional centers. Only variable costs for reimbursement of transportation costs are considered.

3. Option 3: Visits at home

Organize medical specialists' regular visits to rural locations compensating transportation fees to them in order to provide wider coverage and accessibility of medical services for pregnant women. This option costing assumptions vary from the one above as we have calculated average number of pregnant women in an average rural community. Thus the transportation cost now is less per beneficiary.

4. Option 4: High-quality mobile services at home

Purchase of several medical mobile centers (vehicles) with equipment for initial diagnostics so the professional medical personnel implement regular mobile visits to rural areas in order to provide high qualified accessible medical services for rural women.

Methodology of how effectiveness was measured or estimated

Effectiveness measured and estimated based on number of pregnant women and additional visits from rural areas receiving full scale of antenatal services within the 2nd, 3rd and 4th policy options.

CE Ratio Results

Results of options calculated are summarized in the Table below.

Table 7 Cost effectiveness ratio calculation by each option

<i>Policy options</i>	<i>Coverage/ Beneficiaries</i>	<i>Total Cost of intervention, in 000 AMD</i>	<i>Savings, in 000 AMD</i>	<i>Net cost of intervention, in 000 AMD</i>	<i>C/E ratio, in 000 AMD</i>
Option 1: Status Quo adjustments	15,000	-	30,340	(30,340)	-2.02
Option 2: Compensation for transport	15,000 ⁸	120,000	-	120,000	8.00
Option 3: Visits at home	15,000	266,718	182,039	84,680	5.65
Option 4: High-quality mobile services at home	15,000	350,718	182,039	168,680	11.25

The table above presents the options with number of beneficiaries (pregnant women) being the “effect” measure. However, it is more beneficial from presentation perspective to transform this effect measure into the “number of visits” as the policy issue in our country is not the number of beneficiaries being covered by the program but the volume of budget service utilization by the beneficiaries (i.e. number of visits). In other words, the primary purpose of this policy proposal is to decrease the gap of service utilization by pregnant women in rural areas vs. urban areas.

Therefore, the options above are presented below in a transformed way, whereas the “effect measure” is the additional number of visits. So, first, the calculation is made for the number of visits and then the amount of additional visits is subtracted from the estimate of the current average number of visits in rural area (compared from the number of visits in urban area).

⁸ The actual level of participation is difficult to predict (most likely it will be below the 100% level). Different participation ratio scenarios can be applied here (10%, 25%, 50%, 75% and 100%). However, we did not present those results in the table as the function is linear and CE ratio is the same for all the models – it is only the scale of financing that linearly moves with the participation ratio. The above is explained by the fact that this option, in fact, carries no fixed costs and variable costs are constant per user

Table 8 Effectiveness measurement for total number of visits

<i>Policy options</i>	<i>Coverage/ Visits</i>	<i>Net cost of intervention, in 000 AMD</i>	<i>Total cost of program for rural, in 000 AMD</i>	<i>Marginal C/E ratio, in 000 AMD</i>	<i>Program C/E ratio, in 000 AMD</i>
Option 1: Status Quo adjustments	75,000	(30,340)	151,699	#DIV/0!	2.02
Option 2: Compensation for transport	120,000	120,000	302,039	2.67	2.52
Option 3: Visits at home	120,000	84,680	266,718	1.88	2.22
Option 4: High-quality mobile services at home	120,000	168,680	350,718	3.75	2.92

In the table above the additional antenatal visits and costs are calculated. As per the expert estimations (also based on the referenced reports above) the average number of antenatal outpatient visits in rural areas is 5 vs. 8 in urban areas. The government has announced the minimal required number of visits to be 6 (with more visits not restricted and also covered by the government financing mechanisms). Thus, in order to diminish the difference between the urban and rural areas, a policy adjustment must be done to achieve at least additional 3 visits in rural areas.

In sum, the following presents the results of each option:

<i>Policy options</i>	<i>Average</i>			<i>Marginal</i>		
	<i>Coverage / Visits</i>	<i>Total cost of program for rural, in 000 AMD</i>	<i>C/E ratio of program, in 000 AMD</i>	<i>Change in coverage</i>	<i>Net cost of intervention, in 000 AMD</i>	<i>C/E ratio of option, in 000 AMD</i>
Option 1: Status Quo adjustments	75,000	151,699	2.02	0	(30,340)	n/a
Option 2: Compensation for transport	120,000	302,039	2.52	45,000	120,000	2.67
Option 3: Visits at home	120,000	266,718	2.22	45,000	84,680	1.88
Option 4: High-quality mobile services at home	120,000	350,718	2.92	45,000	168,680	3.75

Preliminary discussion of results

The calculations above indicate that the option 3 has the lowest C/E ratio which illustrates the benefits of visiting doctor system in comparison with more expensive mobile higher-quality services and transport compensation options. The latter has another disadvantage which is high risk of low participation of pregnant women for this option as the financial issues may appear not the most significant impediment for pregnant women in rural areas to visit regional healthcare centers. The reasons may vary from lack of infrastructure to cultural ones. The 4th option provides the best quality outcome (as per expert opinion, but

this is not quantified in this report), however, it requires significant capital investments in the first place. In general, the 4th option can be considered as a possible longer-run replacement for the 3rd options so such phased approach for policy options may become the most optimal intervention model for this program.

Interestingly, the comparison of average and marginal C/E ratios (C/E of the total program costs and total number of beneficiaries vs. marginal costs and marginal increase of beneficiaries) also proves that the 3rd option is the best as it provides better (lower) marginal cost per each effect.

Another method for selecting the most optimal policy option can employ a piloting of all 3 or even 4⁹ options, so each option might be piloted in a separate community or even region and then information on success collected and analyzed before the full-scale implementation of any of the above options starts.

⁹ Piloting of the “status quo” option may also show some unplanned non-financial positive results as hospitals then will be more active in offering their services to pregnant women (including by using phone calls, reminders, etc)

WATER SUPPLY

Brief background information on the programs

CEA was narrowed to the programs in drinking water supply services that are heavily subsidized in Armenia since 1990s. The reason for that is two-fold: first, ensuring access to safe drinking water is an important target under Millennium Development Goals and, the coverage of these services is the highest in overall water sector (drinking water supply, sewerage and irrigation)¹⁰. Government interventions in this subsector have been massive since early 2000s in the form of direct subsidies and provision of donor funding for infrastructure repair and development.

Data used for the study are taken mostly from public sources: reports of water supply and wastewater companies to the Regulatory Commission, as well as annual budget reports of the Government of Armenia. In order to estimate impact of assumed policy options/programs on individual households, data from the survey conducted by AST in 2009 was used.

As described in BIA Report, expenditures (financed both locally and from donor sources) in the water supply and sewerage sector were mostly aimed for and directed to the water supply, mostly overlooking the sewerage and wastewater treatment. Therefore, projects titled “water supply and sanitation” were considered as water supply projects unless the project description specifically notes that expenditures and works will be done in sewerage and/or wastewater treatment (e.g EBRD Lake Sevan environmental project).

According to Asian Development Bank Assessment performed in 2007 (Proposed Loan – Republic of Armenia: Water Supply and Sanitation Sector Project) the sector performance indicators for 2006 show the following:

- About 88% of the population has access to drinking water supply, of which 75% have access to piped water supply. About 15% of those with piped water receive 24 hour service and others receive intermittent water supply ranging between 2 and 8 hours. The remaining 12%, according to ADB document, has no access to safe drinking water and relies on unsafe water sources. In rural areas, about 51% of households have taps inside houses, the rest rely on shared, external yard taps or public standpipes. Drinking water is drawn mainly (96%) from groundwater sources through boreholes, wells, and springs. The groundwater resources are generally high quality.
- In urban areas, about 60%¹¹ of households have access to sanitation services but the systems are seriously deteriorated. In rural areas, communities make their own provisions for sanitation, and are seriously inadequate.
- The operating efficiency¹² of water service providers ranges from 25% to 40%, prompting high government subsidies. UFW¹³ ranges from 40% to 90% (with average above 80%) and revenue

¹⁰ 91.4% of Armenian population are covered by drinking water supply program, followed by 74.4% in sewerage and 25% - irrigation services. (BIA Report, AST, 2009)

¹¹ According to the AST Survey, 74.4% of all households in Armenia are connected to sewerage systems.

¹² Operating efficiency is the ratio of revenues from water sales and operating cost.

collection efficiency¹⁴ ranges from 50% to 75%¹⁵. The main causes of low operating efficiency are low revenue, high operating costs, and high UFW.

- Low revenue is mainly caused by low quality of management and services, inefficiency of billing and collection, inadequate legal powers given to service providers against non-payers, and a poor existing tariff structure with no system of future tariff planning.
- High costs are due to oversized, dilapidated and faulty infrastructure, old and inefficient pumps, the increasing high cost of electricity, and lack of system maintenance.
- The high level of UFW is due to system leakages, illegal connections, bypassed and inaccurate meters, and service payment defaulters.

However, since the date of the ADB study, certain improvements in the above mentioned indicators have taken place by 2009. Namely, according to the AST Survey carried out in 2009 91.4% of total population use water supply services. Meanwhile, continuity of water supply in Yerevan reached 20.4 hours per day, covering about one third of population of the country.

Major plans of the Government for the sector are presented in the following documents: Government 2008 Annual Plan, 2009-2011 Medium-Term Expenditure Framework (MTEF), Poverty Reduction Strategy Paper 2008 (PRSP), government decisions and other sectoral documents.

According to 2009-2011 MTEF the main objectives of the Government (GOAM) in the water and sanitation sector are the following:

- Development and implementation of investment policies in the water systems, as well as implementation of expert assessments of investment programs;
- Introduction of private management and private operators, as well as combined and complex types of management pursuant to the Water Code;
- Improvement of the management system in water companies; enhancing their financial viability through reducing operational and maintenance expenditures, reducing the level of water loss and enhancing collection performance.

Priorities of the sector are:

1. Improving the quality of supplied water, ensuring water supply stability, reducing the water losses, as well as a gradual switching to round-the-clock water supply;
2. Capital repair of water systems and their technical upgrading, as well as rehabilitation of distribution networks.
3. Enhancing water companies financial viability through improvement of the management system and further partnership with private sector

According to Government of Armenia (GOA) 2008 Program:

¹³ Unaccounted-for Water: difference between produced and sold water as share in total produced.

¹⁴ Revenue received as percentage of the amount billed.

¹⁵ According to companies' reports to PSRC, collection rates are above 90% for 2009.

In the water supply and sanitation sector the Government will focus on improving the quality of supplied water, sustainable water supply, reduction in water losses and a gradual provision of 24-hour water supply. Public investments are planned to be mainly funded under bilateral and multi-lateral donor support from concessional loans and grants. Special importance is attached to the proper maintenance and operation of existing and newly-operated capacities in the system, for which direct allocations will be planned in the State budget of the Republic of Armenia. A longer-term reform program for potable water and irrigation will aim at increasing the reliability and efficiency of these systems and targeted State support for the irrigation system, reducing water losses, and improving the quality of sewage systems. Deepening of water management reforms will be managed by the Government by a continued and expanded process of decentralization of system management. Within the framework of the Government investment priorities it is planned:

1. Make public investments, mainly from concessional loans provided to the country within the framework of bilateral and multilateral donor assistance, and
2. Address the issues of proper operation and maintenance of both the existing utilities and those to be established
3. Ensure proper maintenance, renovation and reinforcement of hydro-technical structures, ensuring their safe and uninterrupted operation
4. Government will approve an investment plan for water supply in rural areas and public investments will primarily be used to address issues identified in the program.

The long-term aims of the GOAM are not defined in greater detail at this time, but comply with the overall goals as stated in the National Water Program Law of 2006.

In line with the Millennium Development Goals, by 2020, the GOAM targets to achieve 24-hour available domestic water supply throughout the country, 100% coverage of safe drinking water (from 88% in 2007 and 91.4% in 2009), and 90% sanitation coverage (from 60% in 2007 and 74.4% in 2009), (ADB, 2008, AST Survey, 2009).

As one could see the problems faced by the water supply and sanitation sector of Armenia are numerous: apart from tariffs insufficient to cover current costs of service, the magnitude of investments required is huge. However, it does not seem feasible to estimate the actual amount of total investments necessary in the next 10-20 years to achieve the desired results as defined in various government documents. Moreover, there are no clear priorities defined in terms of subsectors (water supply vs sanitation, urban vs rural infrastructure). Eventually, those investments will need to be repaid back from tariffs, since bulk of investments up to now were funded from concessional donor loans. In addition to the main research question, an important question is what the sector should or will have to do in the absence of such funding. Where should the scarce resources mobilized from and where or how should they be spent.

Description of cost data

Current interventions of the Government in the water supply and sanitation sector are derived directly from adopted policies, as well as heavily affected by the availability of concessional¹⁶ credits provided to this sector by IFIs.

Thus, interventions to this sector so far were mostly in the form of (i) subsidies to water companies owned (partially or entirely) by the Central Government to cover operational gaps, (ii) direct investments in these companies to repair and improve water supply and sewerage infrastructure and provision of concessional loans for the same purpose. Notably, all 5 water supply companies are currently managed or leased by private operators under Private Sector Participation arrangements. The last form of intervention was financed out of IFIs' credits that are initially tied to an infrastructure repair/renovation program. Thus, the two main channels of interventions can be summarized as subsidies for operating gaps (that included effects of low tariffs and incomplete tariff collections) and capital expenditures funding.

However, **the policy stated in the Water Code is to gradually move towards cost-recovery of tariffs** along with increasing incomes of population and improvement in the performance of water supply and sewerage companies (WSCs). To that end, tariffs have been gradually increased during the past 10 years from AMD 46 to their current levels of about AMD 180 per cubic meters (CM) of supplied water. Along with tariff increases, the revenues from customer payments have increased, while amount of subsidies - decreased until 2009¹⁷.

Table 9. Main financial parameters of the water sector in 2005-2009

	2005	2006	2007	2008	2009
Water Supplied, mln CM	114.9	96.3	91.7	98.6	92.0
Total Sales, mln AMD	12691.1	12792.5	13571.1	14179.8	14,723.1
Payments from customers, mln AMD	8993.8	10295	11719.4	12588.1	13,834.6
Payment collection rates, %	71%	80%	86%	89%	94%
Current Subsidies to WSCs, mln AMD	2,568.8	1,633.6	1,381.3	1,287.0	901.8
Total Current Expenditures, mln AMD	11,562.6	11,928.6	13,100.7	13,875.1	14,736.4

According to the Sustainable Development Program (SDP, Revised PRSP, 2008, p. 357 -359), the major reason for continuing keeping water supply tariffs below cost-recovery levels is affordability concerns, which can still be a considered a valid concern for low-income quintiles. However, estimates of an "affordable"¹⁸ tariff level for the lowest quintile households as of 2006, according to SDP, were almost equal the average tariff for 2006. Those SDP estimates and projections for "affordable" tariff level suggest that water supply and sanitation can be increased significantly in the medium term without major affordability problems for low-income quintiles (SDP, p.359).

¹⁶ Such credits for Armenia have maturity period of 35-40 years, 0 interest rate, 0.75% service charge p.a.

¹⁷ It is worth noting that subsidization was seized in 2006 for Yerevan until 2010. Starting June 2010, the Regulator left unchanged the tariff for Yerevan Jur company, therefore Yerevan Municipality intends to compensate the difference to the private operator (Lessee) directly. Therefore, total amount of subsidies will increase in 2010 and presumably, 2011.

¹⁸ Here, SDP discusses only "current" or operational cost-recovery tariff levels.

Nonetheless, it is concluded that in the medium term tariffs are not likely to be set to cover also capital expenses, therefore the sector will remain a priority in terms of investment financing for the entire span of SDP implementation (until 2021) with special emphasize in the medium term on concessional bilateral and multilateral financing sources. SDP estimates that public investments in this sector will reach 0.3% of GDP and remain at that level from 2018 and beyond. The service objective is to reach 22 hours/day water supply (average for the country) by 2018 from 12 hours/day¹⁹ in 2006.

The Table below summarizes the capital expenditures funded by the Government: as it is seen, bulk of capital expenditures were financed from credits and grants received from donors and IFIs.

Table 10. Dynamics of capital expenditures from the state budget in water sector

	2005	2006	2007	2008	2009	Average 2005-2009
Total Capital Expenditures, mln AMD, including:	7,297.8	4,075.9	4,722.9	5,354.6	10,851.2	6,460.5
IFI-funded	7,297.8	3,977.9	4,614.6	5,295.2	10,468.8	6,330.8

On average, AMD 6.5 bln was spent annually for capital investments during 2005-2009 with only tiny fraction been funded from local sources.

Methodology of how costs were calculated or estimated and Description of effectiveness data

Currently the Government does not target increasing the coverage of drinking water supply as a primary policy objective since, as mentioned above, more than 90% of households in Armenia have access to drinking water supply. Therefore, the priorities in the sector aim at improving the water supply service (increasing continuity), reducing water losses through renovation and repair of worn out system and networks. This is also reflected in current interventions of the Government in the sector. In that regard, our program options are designed to compare with the cost of the current policy.

Based on overall long-term objectives of the Government and the current state of tariffs and subsidization, we designed the following options for CEA:

- Option 1 (Status quo): Continuing the current practices of subsidies and investment financing for indefinite period of time.
- Option 2: Increasing the tariffs to a level that ensures operational cost-recovery, simultaneously providing compensation to the poor households for the increased part of tariffs (capital expenditures will continue to be funded by the Government as the owner or co-owner of water supply companies).

¹⁹ Duration of average water supply per day is given as presented in the Sustainable Development Program, 2008.

- Option 3: Increasing tariff to ensure full cost-recovery (including capital expenditures) and simultaneously compensating the increase to the poor households, so that the effect of tariff increase is 0 for such households.

Apparently, Option 3 is not considered as practical recommendation for the short and medium term, but can be a worthwhile discussion to estimate the size of the potential impact on households and the government budget if tariffs are gradually increased to cover the full cost of service provision. It is apparent that capital financing from concessional donor funds is much preferable option as compared to increasing tariffs as long as such funds are available. However, in a long-term perspective bilateral and multilateral donors may divert their funds to other sectors (or discontinue concessional lending to Armenia) which will leave two options available: all capital expenditures to be funded by the government from general taxes or transfer all or part of the burden onto consumers through tariffs. Obviously, there can be another option which represents an intermediate combination of the two: gradual or partial increase in tariffs to include capital expenditures with some of investments continued to be funded by the government. Therefore, it is reasonable to estimate the potential impact on tariffs and further discuss policy options.

Option estimates were designed based on:

- current average consumption patterns,
- actual payments - receipt of funds from customers and the government (vs. sales that are calculated on the basis of set tariffs)
- actual capital expenditures borne during the last several years (vs. depreciation of assets that ideally should be part of the tariff),
- Average numbers of households that received regular Family benefits during 2007-2009 (117,779 households).

Furthermore, taking into account that the companies underwent significant reforms and changes during the past 5-7 years, a “reference year” was created that reflects the most recent situation in the sector. In particular:

- Volumetric supply of water to customers: average for 2007-2009 is taken. The objective was to avoid the impact of improved metering at consumption point that took place starting 2003. As of end-2009, the share of metered customers in total exceeded 80%, while as of end-2006, less than 70% of customers were metered. Others were billed according to a normative²⁰. Therefore, it is more reasonable to extrapolate average 2007-2009 consumption data. Ideally, for Options 2 and 3, one should take into account possible impact of increased tariffs of consumption pattern. However, since the sector data still bears the heavy impact of metering introduction, it is hard to estimate how additional increases may affect consumer behavior. Nevertheless, in order not to overestimate the possible consumption volumes, we have taken the lower value of the average per person consumption range in our projections – 80lpd.
- Annual capital expenditure volumes: average for the past 5 years is taken to neutralize annual fluctuation effects that are usually caused by slower project pace in the beginning and much faster performance towards end of project.

²⁰ The normative was set 250 liters per person per day (lpd) for non-metered connections in Yerevan and 150lpd elsewhere. In practice the actual metered average per capita consumption of water is about 80-90 lpd. This leads to an assumption that increase in tariffs will stimulate installation of meters by customers to avoid overpaying. The cost impact of meters installation on poor households can be ignored for two reasons: it is very low (less than USD 25) and it is subsidized by the Government for HHs in the Family Benefit Program.

- Tariffs: tariff collection level was around 90% of bills for the past 3 years which implies that the actual “burden” on households is lower than it would be if calculated at tariffs set by the regulator. On the other hand, this is exactly the reason why the government subsidizes these companies. Therefore, the actual average “effective” tariff for households would be total payments divided by the volumes of billed water. (It was assumed that tariffs set by the Regulator will be the same as in 2009).
- Amount of subsidies under Status Quo option: (i) Average for the past 3 years was taken as basis. In addition to that, a sum equivalent to the subsidies announced by the Yerevan Municipality was included (annual volume of water supplied to consumers multiplied by the difference in applied for and approved tariffs of AMD 14 per CM);(ii) average of capital expenditures funded by the Government in the sector for the past 5 years was taken.

Options can be compared on the basis of their total impact (cost) on the government budget, as it is assumed that gradually (and eventually) the consumers will need to pay for the full cost of services they consume. However, comparison can be made also through ratios – cost of subsidies per 1 beneficiary (either at household or individual beneficiary levels). However, consumption of water is rather determined at household level as compared to individual level, since many household chores are done in a “centralized” manner. Therefore, we preferred to make all calculation at household levels.

Assuming that a subsidization program by definition is a pro-poor policy and strives to ensure improved access or affordability of certain service or goods for the poorest strata of a country’s population, one would take the number of poor to calculate the CE ratios. In Armenia, social support programs are mostly implemented through the Family Benefit program²¹ which targets the poorest households. According to the WB report “Armenia: The 2008-09 Global Economic Crisis, Policy Responses, and Household Coping Strategies” (2010), “about 61% of Family Benefit program funds went to the lowest quintile, making it one of the well-targeted programs in the region. Thus, choosing the actual beneficiaries of the Family Benefit program as a target group for any subsidization or support program will automatically ensure reasonably adequate targeting of assistance.

A household is considered eligible for inclusion in the Family Benefit program if it meets certain criteria: various parameters are taken into account to calculate the total household score, such as social group of each of the household member, number of individuals not able to work, location, housing conditions, average monthly income, etc. During 2007-2009, on average 117 779 households received Family Benefits (Annual Budget Reports, Ministry of Labor and Social Issues of Armenia, 2007, 2008, 2009). Thus, one could consider this number as a good proxy for the number of poor households – i.e. primary target beneficiaries for any subsidization program in Armenia. In our calculation of CE ratios, this number is taken as the beneficiary number.

Methodology of how effectiveness was measured or estimated

The effectiveness assessment of the options is based on the fundamental principle of the economic definition of the subsidization of any sector, i.e. the current policy lacks targeting and “subsidizing all while collecting taxes from all and applying the same tariffs to all” is economically a nonsense and useless policy.

²¹ Under the Ministry of Labor and Social Issues. www.mss.am

Therefore, the core for the measurement of the effectiveness is that the beneficiaries are identified as those who really can be recipients of subsidies, i.e. the ones in need. In Armenian context it is the lowest quintile of the population. Hence, the methodology of effectiveness assessment is identify the real cost of the policy options on real beneficiary of that policy (including the current policy).

Results of the options calculated are summarized in the Table below.

Table 11. Calculations results (simulations on options)

	Option 1 (Status Quo)	Option 2 (Operational cost recovery)	Option 3 (Full cost recovery)
Increase in tariff level, %	unchanged	14%	60%
Subsidies to water companies, AMD mln	1,967.0	0	0
Benefits (compensation) to the poor, AMD mln		278.5	1,193.4
Capital expenditures funded by the Government, (average 2005-09) AMD mln	6,460	6,460	0
Total expenditures from the Budget, AMD mln	8,427.5	6,739.0	1,193.4

Option 2 implies that the tariff increase to operational cost-recovery level (by 14% from their current level) can be borne by the non-poor households without causing affordability issues. However, in order to neutralize the effects of tariff increase on poor households of the 1st quintile, the government will need to provide compensations to about 117 thousand households (about 460 thousand individuals) in total amount of mAMD 278.5.

The difference in amount of about mAMD 1.7 bln ($1,967 - 278.5 = 1688.5$) will be paid by non-poor households in Quintiles 2-5 almost evenly²².

Under Option 3, the purpose was to estimate the amount necessary to be paid as compensation to the poor if the tariff is set to cover the full cost of service (including annual capital expenditure amounts as a proxy for depreciation of fixed assets). According to data of recent years, the tariffs will need to be increased by 60% in order to cover not only total operational expenses, but also about AMD 6.5 bln as average annual capital expenses. Other things being equal, such an increase will increase the shares of water supply and sewerage (WSS) expenses in household expenditures by the same magnitude. The Table below shows the average shares of payments for WSS services in household expenditures per quintiles, as well as the same shares if tariffs are increased to full cost-recovery level.

Table 12. Average monthly WSS bills under Status quo and discussed options

	Average monthly HH bills, AMD	Increase from Status quo
Status quo	1,407.5	
Option 2	1,604.6	197.1
Option 3	2,251.9	844.4

²² Benefit incidence in drinking water supply ranges from 19.75% in Quintile 2 to 20.85% in Quintile 5. Benefit Incident Analyses, Strengthening Institutions to Improve Public Expenditure Accountability project, Advanced Social Technologies, Armenia 2010

For Quintiles 2-5, the share in total expenditures will still be below 2.5%. Thus, such an increase in tariffs should not create any major problems for the non-poor households. As for households in Quintile 1, the burden of new tariffs may be quite substantial.

Table 13. Current and potential costs (share in HH budget) on households

	Share of WW payments in household expenditures, 2009 ²³	Share of WW payments in household expenditures, tariffs increased by 60%
Q1	2.16%	3.45%
Q2	1.50%	2.40%
Q3	1.34%	2.14%
Q4	1.21%	1.94%
Q5	0.76%	1.21%

Therefore, again, Quintile 1 will need compensation in order to neutralize or mitigate affordability problems that may arise. If the government chooses to fully apply this option, then total amount of compensations will reach mAMD 1193.4 for the poorest households included in the Family benefit program. This amount will be sufficient to neutralize the effects of raising the “effective” tariffs from their current average level of AMD 150 to AMD 240. It is worth noting that mAMD 1193.4 already includes the compensations necessary for the level of tariffs to reach operational cost-recovery (mAMD 278.5), while the remaining mAMD 914.9 will be the “contribution” of the poor to the pool of funds necessary for capital expenditures. The non-poor households will therefore pay for the corresponding remaining blocks of operational and capital expenditures.

CE Ratio Results and brief preliminary discussion of results

As noted above, the Government currently subsidizes the WSS companies – both for operational and capital expenditures – in order to avoid the need to drastically increase tariffs. Logically, any subsidization policy, or policy to maintain tariffs at low, affordable, levels is a policy targeted at poor strata of the population. In other words, the Government addresses the social, health and other concerns connected with access to water. The current policy covers all 5 quintiles almost evenly; however, logically affordability is a major concern for the poor, i.e. Quintiles 1 and partially Quintile 2. In other words, all taxpayers pay for the part of services rendered to all 5 quintiles, no matter poor or rich. However, targeting of any subsidization program can be improved by narrowing the beneficiary group to the poorest population. I.e., taxpayers can “save” money by paying only for any intended part of the services delivered to the poorest households.

Overall, the total impact on government will be:

- under Option 2, decreased from AMD 8.4 bln to AMD 6.7 bln (savings of AMD 1.7 bln),
- under Option 3, decrease from AMD 8.4 bln to AMD 1.2 bln – savings of AMD 7.2 bln (see Table above).

²³ AST Survey, 2009.

One should note that, although the differences under both Options 1 and 2 (AMD 1.7 bln and AMD 7.2 bln) will be paid for by the non-poor households²⁴ without any major impact on the water supply companies in terms of finances, however, the sector overall will then be much more sustainable and operating on business terms. Under considered options, there will be no direct subsidies paid from the Government to water supply companies: all revenues will come from actual customers as payments for services. However, part of the households will be supported financially to neutralize the burden of increased tariffs for them.

These totals can also be presented in ratios. As described above, total cost can be divided by the number of program beneficiaries to identify the cost to the Government per beneficiary. The CE ratios or Cost per beneficiary is presented both in annual and monthly terms.

Table 14. CEA Ratios for water sector policy alternatives

	Option 1 (Status Quo)	Option 2 (Operational cost recovery)	Option 3 (Full cost recovery)
Total Cost (Operational Subsidy + Capital expenditures), AMD mln	8,427.5	6,739.0	1,193.4
Number of poor HHs	117,779	117,779	117,779
Total Cost per 1 poor HH, AMD annually	71,553.4	57,217.3	10,132.3
Total Cost per 1 poor HH, AMD monthly	5,962.8	4,768.1	844.4
Comparison to Status Quo, % change		25%	606%

The ratios show that currently the Government spends AMD 5.9 thousands per month per each potential beneficiary household. However, if tariffs were increased by 14% to cover full operational cost-recovery (capital expenditures continued to be funded by the Government), the Government had to pay AMD 4.8 thousands to each poor household to make up for the increased tariffs. The remaining non-poor households would have to pay, respectively, 14% more for water supply services (provided that they do not change the consumption pattern as a result of tariff increase). Nevertheless, Option 2 still leaves the burden of financing the capital expenditures on the Government (app. 6.4 bln AMD annually) while reducing the overall annual burden by about 25% (See Table above).

If the tariffs were raised to a level to cover all costs of the sector – both current and capital (by about 60% from their current level), the Government would have to pay about AMD 844.4 per month to each poor household so that they could pay for water supply bills without changing the consumption volumes. Again, the difference between the current total allocations to water sector and the total amount of water subsidies paid to the poor will need to be paid for by the non-poor, presumably increasing their bills by 60%. However, the burden for the Government will decrease about 7 times.

In such a way, the overall sector sustainability will reach a much higher level as compared to the current situation. The potential problems with the current state of things, as seen above, relate to the capital expenditure funding, while the operational expenditures will not constitute a serious problem. In particular, problems will become evident when donor funds are no longer available to finance capital expenditures

²⁴ Plus non-domestic consumption.

necessary to repair the existing infrastructure. Meanwhile, if the sector gradually switches to be paid for the services fully by those who receive services it will become less vulnerable to decisions made exogenously.

However, the policy questions facing the water sector in Armenia cannot be adequately addressed using only cost-effectiveness analysis. Further choice of policy options and recommendations to the policy-making institutions should use various analyses methods and also carefully consider the following issues:

1. Priorities of spending the limited donor funds in the sector;
2. Changes in water tariffs;
3. Different approaches to subsidies poor households, and
4. Combination of above.

Plans for extensions or modifications in the next draft

The following steps can be implemented during the next stages of the project. The scope for further improvements and modifications will be dependent on the feedback on this report.

- Policy Discussion and Recommendations: discussion of a phased approach of increasing tariffs along with reduced availability/access to concessional international lending to the sector
- Analyses of possible factors why the government does not opt for the discussed policy options (problems, obstacles, potential risks they may see)

REFERENCES AND RESOURCES USED

EDUCATION

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- Monitoring and evaluation report on “Pilot project for separately operating high schools” conducted in April-August 2009 by a team of local research experts in the framework of Education Quality and Relevance Project;
- Report on the survey of high school students conducted in September 2009 by a team of local research experts in the framework of Education Quality and Relevance Project;
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