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Adjusting the Primary Care Capitation Formula in Armenia

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ACRONYMS

MA	Medical Ambulatory
MTEF	Medium Term Expenditure Framework
PHC	Primary Health Care
PHCR	Primary Health Care Project
SHA	State Health Agency
TB	Tuberculosis
TRF	Total Fertility Rate
WHO	The World Health Organization

EXECUTIVE SUMMARY

Based on stated concerns of the MOH that the current two tier capitation structure may provide disincentives for full primary care treatment of young children and the very old, PHCR explored capitation systems used for primary care in the UK and Estonia and relative utilization data for Russia, Uzbekistan, Mongolia, Chile and Israel.

Key Findings

1. The basic capitation rate for primary care in Armenia is relatively flat across age groups. One capitation is paid for each person over 18, double this amount for persons under 18. There is no differentiation by gender.
2. Other capitation formulas for primary care (Britain, Estonia) have greater differentiation by age. Payments for very young children are larger than average, as are payments for those of pension age. The British system also increases the capitation for women of reproductive age.
3. Utilization data from Russia, Chile, Uzbekistan and Israel shows a similar pattern, with a steep rise in utilization by the oldest citizens (except in Uzbekistan)
4. PHCR developed an Excel based model to analyze the sensitivity of payments to individual primary care facilities if the capitation structure were changed. Adjustments in the capitation could be made quite readily using the model developed, while keeping the total national health care budget "revenue neutral."
5. Total reimbursement for individual facilities would change only moderately, but greater differentiation in rates would provide funds to offset the higher needs of very young children, and limit the incentive to avoid older patients or discourage them from using services.
6. A methodology for using the MIDAS III data to create capitation adjustments based on Armenian experience is proposed in the report, and should be relatively straightforward to implement

PHCR should work with SHA now to test various capitation structures with the model before primary care reimbursement rates are set for 2010.

I. OBJECTIVE

This paper is intended to provide guidance to the Ministry of Health and State Health Agency in considering revisions in the formula used for payments to Armenian primary care providers. At the moment, the formula includes an annual payment for care of children under age 18 that is twice the per capita amount paid for each patient over that age. There is no differentiation by sex.

It is generally understood world wide that the primary care needs of very young children (less than 24 months) are high---required immunizations, checkups and frequent incidents of infectious disease. However, in most countries, this utilization falls rapidly by the age of five and remains low through the teen age years and into early adulthood, with women of reproductive age requiring more care than males of the same age.¹ By middle age, care needed for the diagnosis and treatment of chronic disease begins to drive up utilization, and the need for medical care (and the number of physician visits) generally continues to increase with age.

The immediate issue in Armenia is to consider possible adjustments by age and sex in the primary care capitation formula. Until data is available from the MIDAS III primary care encounter system now being programmed², it will not be possible to create age/sex adjustments from actual Armenian utilization data. Because of the long history of underfunding in the Armenian health care system, primary care utilization (about two visits per person per year) is low compared to other countries. Utilization is increasing slightly as the Government has invested more in primary care over the last three years, and the economy has improved. However, it is still far below the levels seen in Soviet times, and below the levels in other former Socialist economies or in the industrialized nations of the West. Even if current primary care utilization data were available, it would not necessarily be a guide to the capitation adjustments needed in a fully utilized primary care system.

In this paper, we review the experience with variation in care utilization and capitation adjustments in several other countries, including Russia. We analyze the data available and suggest a range of age/sex adjustments which might be implemented in Armenia based on the experience of these other countries. In the final section, we outline how MIDAS III data can be used in the future to create capitation adjustments specific to Armenian experience. However, caution should be used in making such “experience adjustments” until actual primary care utilization patterns come into line with experience world wide.

¹ Given the role of the primary care system in countries like Armenia and Russia in screening males for universal military service, there may be a spike in utilization in the late teen age years prior to induction.

² The software is scheduled to be delivered for testing in August 2009, with user training and software installation at primary care facilities occurring from September through December 2009. The system is to “go live” on January 1 in order to provide a full year of data for 2010. This data is to be used in calculating performance bonuses for primary care facilities in 2011.

II. ELEMENTS OF A CAPITATION FORMULA

Objective

Capitation formulas are a form of risk adjustment---designed to adjust health care payments to the intrinsic differences in medical need (and therefore in the cost of appropriate services) for different groups of individuals. The formula may be used to distribute Government funds or subsidies to different purchasers; insurance companies, or in the case of the British National Health Service, Regional Trusts that purchase primary care services. Or, they can be used to pay actual providers of care---either as the sole source of revenue, or in conjunction with payments for selected services, performance bonuses, or coverage of fixed costs.

Capitation formulas may have objectives other than adjusting for currently expected costs. They can be used to encourage/facilitate additional services. This occurs when an additional allowance is made for areas/providers with a service population that is of lower income or education, or with an observed higher rate of mortality or morbidity³. Also, by exempting certain services from the capitation, and paying for these on a fee for service basis, a payment formula provides a greater incentive to deliver these services. For example, for a long time British general practitioners were paid on a fee-for-service basis for family planning services, in order to encourage them to actively offer these services to their patients. Now they also receive additional payments for minor surgery, to reduce the number of referrals and free up time in surgical centers for more serious operations.

In general, a capitation adjustment may be used at one of the following levels:

- to adjust payments to, or transfers between, insurance companies. If effective, such payments should remove the incentive for the insurer to “cherry pick” low risk insured, and compensate insurers that experience adverse selection of higher risk insured (such as an insurance fund that covers an industry with aging workers)
- to adjust budgets or subsidies for health purchasers, such as the Primary Health Care Trusts in the United Kingdom
- as all or part of the system of payments to a particular provider (individual or group). The use of capitation formulas is particularly common in primary care. The formula may be used solely to pay for the services rendered by the provider, or might include payments to be used for services to which the provider makes a referral (often referred to as fund-holding). For example, capitations might include the cost of essential drugs prescribed for the patients.

In Armenia, we are currently interested only in the third type of capitation payment, that which is actually made to the service provider---in this case a polyclinic or family practice.

³ Such adjustments are included in the British capitation formulas for Primary Care Trusts and general practitioners

Services Covered

What utilization data should be used to derive capitation formulas? The ideal approach would be to use data only on the services which the provider is expected to provide. However, Armenia does not currently have this data from primary care providers, and if it were available, it would undoubtedly suggest undesirably low levels of utilization.

Not all systems have data specific to primary care utilization, but do have data that shows how overall medical expenditure varies with variables that could be included in a capitation formula. Analysis in the Netherlands⁴ and in Russia⁵ suggests that variations in total expenditure and primary care expenditure track each other quite well; thus, it is worthwhile to review formulas used to adjust subsidies for total health expenditure as we consider possible adjustments in the primary care formula.

If services are excluded from the capitation formula and paid separately, this can make a difference in the adjustments by age and sex. The most obvious examples are with maternity services. If maternities are reimbursed separately, as is the case in Israel, then the differential in capitation factors for males and females of reproductive age is reduced. When Israel changed its formula to exclude maternity services, the adjustment showed relative use by the oldest population (>75) rising from 4.77 times that in the population aged 25-34 to 6.28 times the utilization in that group. With maternity excluded, it is more reasonable to use the same capitation factors for males and females of a given age, as is done in the Israeli insurance system. At the moment, the Armenian primary care system contains a separate reimbursement element for facilities that have obstetricians on staff, or who have qualified family practitioners that can manage pregnancies. If age and sex adjustments from other jurisdictions that include maternity are used as a guideline, then Armenia may want to put maternity related elements of current payments into the general capitation pool.

Risk/Utilization Factor Adjustments

Among the factors used in other countries to adjust capitation formulas are the following:

- Age and sex
- Measures of remoteness or population density. Sparsely populated areas imply longer travel times by clinicians and patients, lower enrollment and higher unit costs, and the need for primary care practitioners to perform some services that might be referred to an emergency room or specialist in a big city
- Socio-demographic factors associated with deprivation and lower health status (low education, low income, high percentage of single parents or welfare recipients)
- Institutional residence. Patients in residential care have medical conditions that render them unable to care for themselves and in need of additional medical management
- Disability status Patients unable to work usually have higher medical needs
- Recorded morbidity or mortality ratios

⁴ Van der Ven et al.

⁵ Frid et al.

- Past utilization history (statistical analysis shows this is a reasonable predictor of future medical need)

Accounting for Historical Cost

The other major factor that can influence a capitation formula is historic expenditure. In general, the more facilities and clinicians in an area, the more services will be provided, and the higher the costs. Moving immediately to a formula which takes into account only the population related factors above to distribute a fixed amount of money may result in drastic cuts in funding for the traditional “high spending” areas. To compensate for this, allocations may be made only partly on the population specific adjustment factors, with a separate term in the formula reflecting past expenditures. Over time, the weighting of this factor can be reduced and greater weight given to “patient need” driven factors in the capitation.

Fortunately, the persistence of historical spending factors need not be a major problem in revising the capitation formula in Armenia. Primary care facilities are generally reimbursed now on a formula that does not specifically include past spending history. Limits on spending for essential drugs and laboratory services may have a historical element, and facilities that offer additional services (such as narrow specialists) do get additional funds. Explicit allowances for additional services (school nurses, narrow specialists, dispensary services, feldsher posts) compensate for the historic difference in level of services. Even these “quasi-historic” allowances are done on a per capita basis, not on the basis of actual facility expenditure. For the purposes of this paper, we can focus only on possible changes in the population related factors.

III. EXISTING PAYMENT FORMULA FOR PRIMARY CARE IN ARMENIA

The basic capitation payment to primary care providers in Armenia in 2009 is as shown below⁶. There is no differentiation by sex. The formula implies that children under 18 require twice as much care as patients over that age. Although the Medium Term Expenditure Plan called for increases in primary care payment rates in 2009, these were generally suspended due to the financial emergency. Maternity payments were raised (from 6,000 to 14,000 drams) to reflect the major price increase instituted with delivery vouchers in July 2008. Per capita normatives for laboratory global budgets were increased slightly to allow for higher fees for TB and oncology tests.

<18	drams/person/year	2,882 drams/person/year
>18	drams/person/year	1,441 drams/person/month

⁶ This age break is probably a result of the traditional division of the patient population at polyclinics between therapists patient (>18) and pediatricians (patients <18). Although there were plans in the MTEF to increase these amounts, the 2009 factors are essentially.

These amounts are increased by approximately 7% for mountainous areas, and 14% for “highly mountainous” areas. This allowance is intended to compensate for both population density and travel difficult and the higher utility costs at higher altitudes where winters are longer.

This basic allowance for primary physician care is not the only element in the primary care formula. Other elements are as follows;

- Adjustment for providing a school nurse
1,112 drams per pupil per year

- Adjustment for narrow specialists

	Dram/person/year <18	Dram/person/year >18
Surgery	107	64
Ophthalmology	107	64
Neurology	107	64
ENT	107	64
Cardiology	107	64
Other Specialty (Yerevan)	107	
Other Speciality (elsewhere)	54	

- Adjustment for maternity services
14,000 drams per pregnancy
- For every male 15-17 (pre-induction)
320 dram per year
- For every girl at 15 (pre-reproductive)
453 dram per year
- Adjustment for dispensary services

	Dram/person/year (all ages)
Psychiatry	50
Dermatology	64
Oncology	64
Narcology	50
Hematology	50
TB	73
Oncology	35
Neuropsychiatric	50
Infectious Disease	35
Endocrinology	64

The schedule also includes certain payments for field visits

As noted above, the facility separately receives a global budget for essential drugs and laboratory services provided under the “state order.” Prices for these items are set by the Ministry. A limited set of these items is available to all patients, a broader set to those who fit into various social categories based on age, diagnosis, disability, or personal history. Facilities are paid on a fee for service basis up to a budget limit for these drugs and tests. The limits are set for different population groups, and a shortfall for one group cannot be made up from a fund surplus in the other group. At the moment “free drug” normative for children up through age 7 is 547 drams per year.

IV. EXPERIENCE IN OTHER COUNTRIES

In this section, we describe capitation formulas or utilization data from other countries that can be considered in creating a more fine grained age/sex adjustment for the primary care capitation formula in Armenia. For each country, we show the services covered (primary care, total utilization) and the level of use (insurance risk adjustment, distribution to payers, payment of primary care service providers). We show the age/sex adjustments or relatives which have been determined. And we indicate other factors that may be included in the capitation formula.

Chile

Application

A large study of primary care in Chile⁷ allows us to see the relative utilization in this Latin American country with a generally good health system. Costs and visits for a sample of 10,000 patients in publicly funded clinics were tracked over two years. While there are inequalities in health care access in Chile, outcomes are reasonably good. Life expectancy is 73 for men and 80 for women, infant mortality 8.6/1,000. Primary care is generally available to all through the publicly funded system, although the wealthier citizens opt for forms of private health insurance coverage. The existing system at the time of the study adjusted capitation payments by geography and local financial capacity (average per capita income), but did not adjust for demographic variables.

At the time of the study, the public funding agency paid a flat capitation of about \$20US per person for primary care, with positive adjustments for rural locations and low income communities. Primary care centers provide antenatal care under the capitation, but refer mothers for delivery. The centers provide a full range of preventive and basic curative services for children and adults

Factors in Formula

In addition to the age and sex factor shown below, the Chilean study showed that certain diagnosis were highly predictive of primary care costs. Patients with hypertension or diabetes were 7% of the study population, but accounted for 38% of the observed expenditures. The authors recommended that the Chilean Government include age, sex and diagnosis with hypertension and diabetes as factor in the capitation formula.

Age/Sex Adjustment

As noted above, there was no age or sex adjustment in the primary care formula at the time of the study. Utilization of care is shown in the table below. Interestingly, 62% of the enrolled population in the sample did not use the primary care facility at all in a given year. Data is shown for preventive care alone, and for preventive and curative

⁷ Vergas, V. and Wasem J. (2006) Risk Adjustment and Primary Health Care in Chile. Croat Med J. 2006;47:459-68

care combined. Both annual visits and annual cost (in local currency) are shown. Note that the average visit frequency per capita (1.59) is slightly less than that currently observed in Armenia, but much less than what occurred in Soviet times. The study also compared utilization by sex—women (as a group) had 3 times the preventive visits of males, and twice the total visits. Costs for preventive care for women were about 2.5 times the cost of preventive care for men; combined preventive and curative costs for women were about twice the costs for males. The study also looked at the difference in utilization between indigent and non-indigent patients. In general, the indigents had somewhat lower utilization

Age Group	Visit Per year		Cost Per Year (Chilean \$)	
	Preventive	Prev. + Curative	Preventive	Prev. + Curative
0-4	0.51	3.41	2,217	20,172
5-44	0.39	1.07	2,780	10,097
45-64	1.27	2.47	1,840	27,706
>65	0.62	2.69	13,775	44,515
Population Average	0.62	1.59	5,244	16,817

The graph below, from the same study by Vargas and Wasem, shows the expenditure data (preventive and curative costs combined) plotted for five year age intervals and differentiated by sex. After age 14, annual primary costs for females are consistently higher than those for males. This graph dramatically shows how primary costs increase in the elderly.

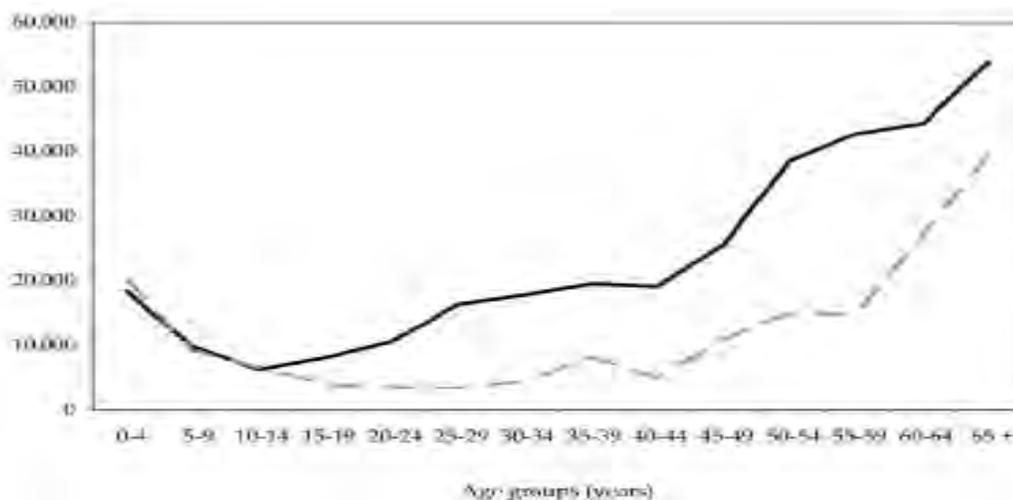


Figure 2. Per capita primary health care expenditure by age and sex groups in 2000 calculated on a sample of N = 10 000 (average = Ch\$16 817). Ch\$ – Chilean pesos (US\$1 = Ch\$540 in 2000). Full line – women per capita expenditures; dashed line – men per capita expenditures.

Estonia⁸

Application

Estonia has moved to a system similar to the United Kingdom, where patients enroll with a family practitioner who is expected to meet all of the patient's primary care needs and serve as a gatekeeper for referral services. These general practitioners are under contract to the national Health Insurance Agency and paid under a system which includes a basic age adjusted capitation rate, supplemented by payments for fixed practice costs and adjustments for rural location, plus fee for service payments (up to a maximum percentage). In 2006, capitation accounted for 73% of payments to family practitioners, fee-for service payments for 15%, practice allowances for 10% and other payments for 2%⁹. As family practitioners acquire the skills and equipment to perform laboratory tests and diagnostic procedures, they can expect to receive additional fee for service income and the cap on such services is being raised. Physicians can also earn additional amounts for meeting certain performance target (similar to the performance incentives agreed in Armenia).

Factors in Formula

Payments per enrolled patient account for the largest part of the physician's income. Prices for services (lab tests, minor surgery, etc) that are paid fee for service are agreed in negotiations between the Health Insurance Fund and the Society of Family Doctors. The fixed practice payment in 2008 was 9,167 euros per year, with an additional allowance of 1,074 euros per year if 20-40 kilometers from a country hospital and 3,081 euros if more than 40 kilometers from such a hospital. The ceiling on fee for service payments in 2008 was set at 27% of capitation.

Age/Sex Adjustment

In 2008, the absolute amount of capitation payments to general practitioners¹⁰ was::

Children 0-2 years	82 Euros per year
Enrolled patients, ages 2-69	34 Euros per year
Enrolled patients, ages 70 and above	41 Euros per year.

Capitation amounts are the same for males and females.

As can be seen, Estonia assumes a rapid drop in the requirement for primary care after the age of two, with the capitation remaining constant until after retirement age, and increasing again for the oldest patients.

⁸ Information in this section is drawn from the Estonia Country Profile published in the Health Systems in Transition Series by the WHO European Health Observatory

⁹ Estonian Health Insurance Fund

¹⁰ Estonian Health Insurance Fund

Israel

Application

Population adjustments are used to distribute payroll taxes (for health) and tax funds to the insurance fund of a citizens choosing. The adjustments, combined with mandatory open enrollment, are designed to limit cherry picking and adverse selection. The Government sponsored insurance fund had enrolled a disproportionate share of the poor, elderly and those with large families.

Factors in Formula

The age adjusted payments are designed to cover the entire mandated benefit package, including primary, specialist and inpatient care. Maternity care is excluded and paid as a fixed amount for each pregnancy. Treatment for five high cost diseases covered in the benefit package is excluded from the capitation adjustment and paid on a fixed cost per case basis. These conditions include dialysis for end stage renal disease, hemophilia and AIDS.

Age/Sex Adjustment

Effective with the implementation of insurance reforms in 1997¹¹, the age/sex relatives used in adjusting payments to insurance companies were as follows.

The same adjustment was used for both sexes in each age bracket. As can be seen, expected utilization for those aged 65-74 is seven times that for persons aged 15-24.

Age	Utilization (Relative to Average for Entire Population)
0-4	1.26
5-14	0.48
15-24	0.42
25-34	0.58
35-44	0.74
45-54	1.21
55-64	1.86
65-74	2.90
>75	3.64

Latvia

Application

In outline, the primary care payment system in Latvia resembles those in Estonia and the United Kingdom. There has been a basic capitation, fee for service payment for selected services and tests, a component for basic practice costs, and performance

¹¹ Shmueli A, Chernichovsky D, Zmora I (2003). Risk adjustment and risk sharing: the Israeli experience. *Health Policy*, 65(1):37-48.

incentives. Primary care practitioners receive additional payments, when they earn additional qualifications.

The Government has now moved to introduce a fund-holding system for general practitioners, with these physicians receiving an allowance under the formula which must cover their referrals to certain kinds of specialists, and presumably the special services rendered in their offices which had been paid on a fee for service basis. When the physician refers, he must pay the specialist a defined fee for each episode of care. Certain specialties (psychiatry, children's dentistry, etc) do not require a referral, and these specialists are paid directly by the insurance program. Hospital admissions are not included in the fund held by the general practitioner, and are also paid directly by the regional sickness fund. The usual concerns are being expressed about the possibility that general practitioners will not make a necessary referral because of the incentives in the fund-holding scheme.

Factors in Formula

The most recently reported capitation was 9.6 Euros per year per person, with age adjustments. 15% of the monthly capitation amount was withheld every month and then paid according to the extent to which the practice achieves various performance indicators.

Adjustments are made to the age capitation for the population density in the catchment area and the distance to the nearest emergency post

Age/Sex Adjustment

The schedule of age and sex adjustments was not available in the generally accessible literature..

Mongolia

Application

A capitation formula already exists for distribution of primary care funding from the aimag (regional Government) to local governments and family group practices. The Government recently asked foreign consultant to help design a system that would more equitably divide funding between the various aimags and Ulan Bator. The consultants were asked to develop allocation factors that would take into account remoteness, differentials in need based upon age and sex distribution of the population, and current maternal and infant mortality measures for the each aimag (and the capital). In addition to compensating for the higher costs associated with remoteness, the new formula---like those in Britain---is designed to provide additional money for those areas with poorer health outcomes. In developing the formula, the experts used geographic data and Mongolian records of maternal and infant mortality (averaged over several years), and the relative age/sex utilization rates developed in a study in Uzbekistan. The experts developed a computer model to conduct the necessary calculations. This model can provide for a gradual transition from historic levels of funding in each aimag to the amounts indicated by the "need based" formula.

Factors in Formula

At the present time, the country has distributed money to aimags largely based on historical cost, which has in part been influenced by the higher costs of delivering care in the remote and sparsely populated districts of the country. As a result, the city of Ulan Bator, with 40% of the population, received about 60% of the country wide average per capita health spending, while some rural districts received twice the average.

Age/Sex Adjustment

The current capitation formula used to pay primary care providers is not immediately available, but the data below are from a survey of Mongolian clinicians about the expected age/sex differentials in primary care utilization. In this study (2004)¹², thirty five clinical experts were asked to estimate relative utilization need in primary care. The estimates were made separately for District Health Centers (which have some basic inpatient capacity) and for Family Group Practices. The relatives were normalized to the lowest utilization group for each type of provider. In both cases, it was males aged 15-59. For children and the elderly, the survey asked for differentiation between the needs of the poor and the non poor. The spike in utilization for reproductive age women as not as high as that shown in the Uzbek data recently used in developing a new aimag distribution formula. This may be because the Uzbek data includes deliveries at maternity hospitals which are not reflected in the Mongolian primary care experience. Total fertility rates in Mongolia and Uzbekistan are similar.

Population Group	Relative Utilization District Health	Family Group Practices
<1, poor	3.07	3.79
<1, non-poor	2.13	3.35
Children 1-4	1.57	1.45
Children 5-14	1.27	1.15
Age 15-59, Male	1.00	1.0
Age 15-59, Female	1.26	1.45
>60, poor	1.75	2.25
>60, non poor	1.3	2.05

This expertise based analysis shows need falling rapidly after the first year of life, although perhaps not as dramatically as in some other studies or formulae. The increase in need for the elderly is also rather modest. However, the entire population over 60 is grouped together. And traditions of care seeking for the elderly may display cultural differences.

¹² Hindle, Rourke, Batsuuru, Orgil

Russia

Application

Payment formulae in the Russian Federation are heavily weighted towards historical cost, particularly when used at the aggregate level (for insurers or regions). This is because there is wide variation in spending on health, which has been exacerbated by the differential economic performance of various oblasts since the break up of the Former Soviet Union. Available funds for health care (on a per capita basis) vary by more than ten times between the wealthiest and poorest oblasts. Moscow, Petersburg and oblasts producing oil, gas or gold have prospered, while other industrial and rural districts have done less well. Public primary care funding is heavily dependent on regional and local financial capacity. For mandatory health insurance (MHI), which makes up a portion of available health funding, finances are managed at the oblast level. There is relatively little redistribution of MHI funds across the country, so oblasts that have a large portion of the work force in well paid formal employment have more to spend on health care.

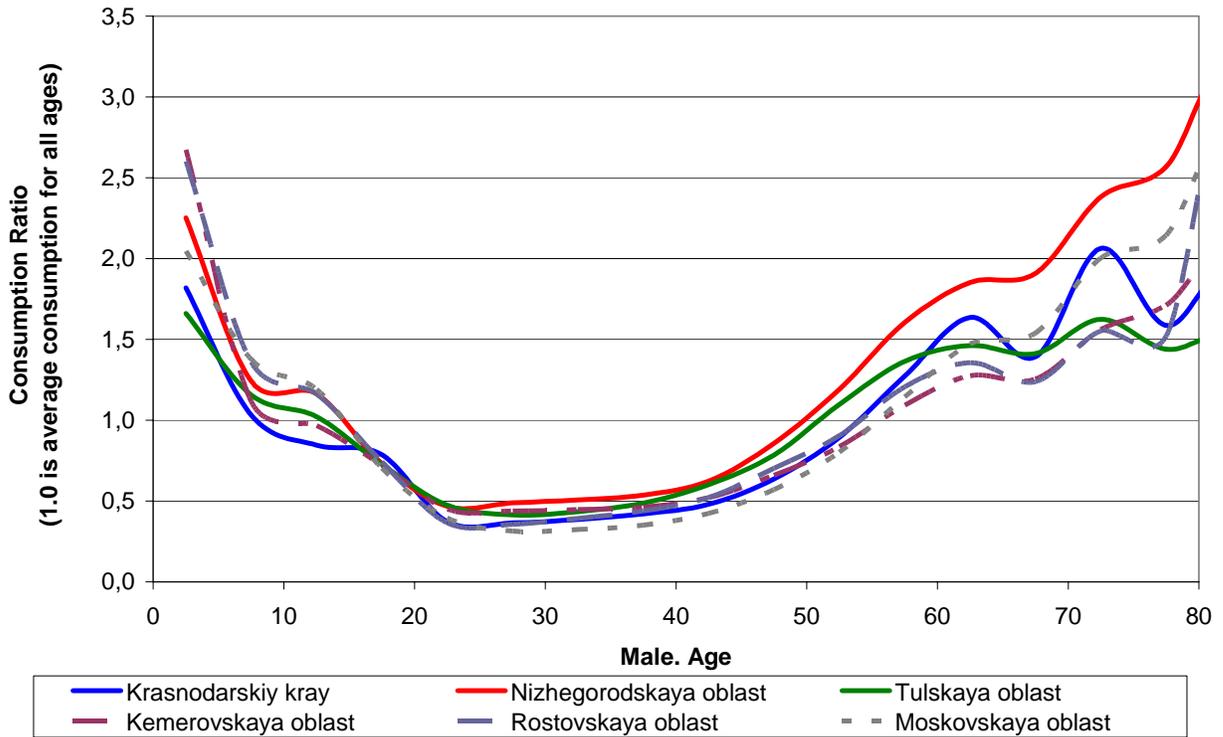
Russian health economists have extensively studied utilization in certain oblasts and nationwide as well. These studies have the potential to show the kind of relative utilization which might occur in Armenia, with its polyclinic oriented ex-Semashko health system and relatively low fertility, **if** total health care utilization had been less constrained by low levels of public health spending.

Age/Sex Adjustment¹³

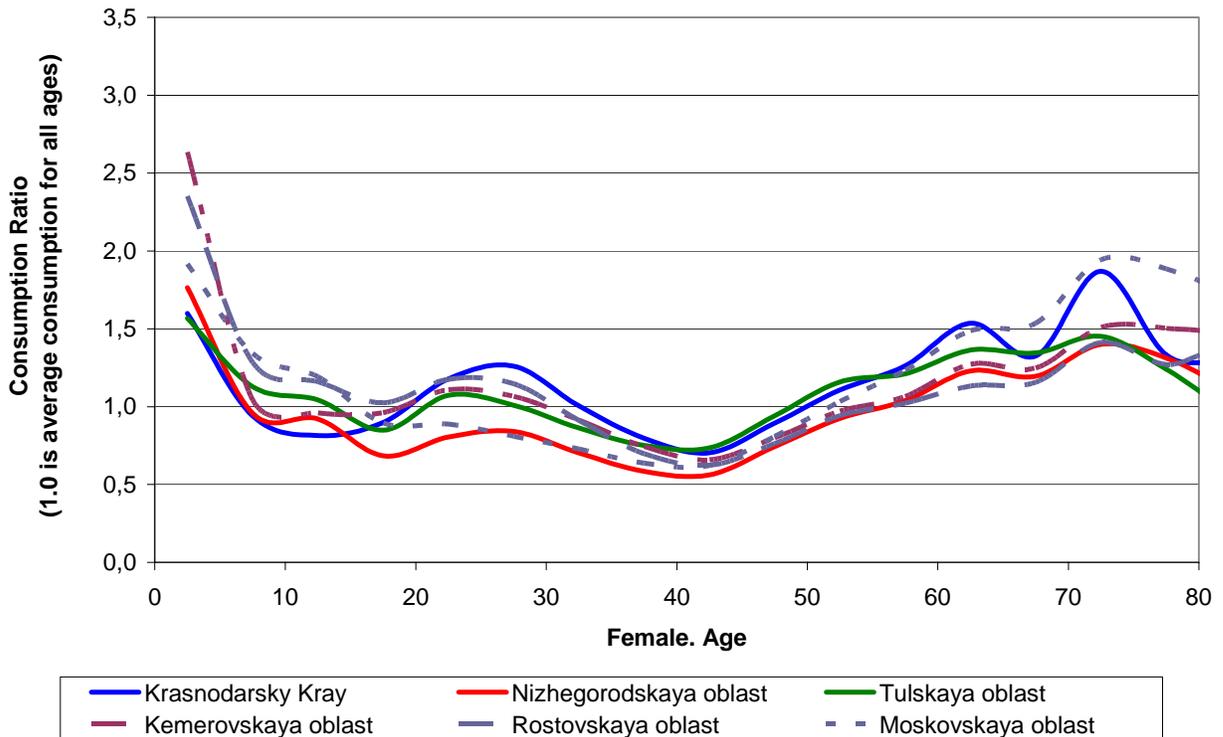
The graphs below show the relative utilization by age for six Russian oblasts. The first is for males, the second for females. The data includes inpatient and specialist services, as well as outpatient care. As noted, the graphs are normalized to the average consumption for all ages. The shapes of the curves are remarkably similar between oblasts.

¹³ Data presented here are from studies done by Edward Frid and colleagues and provided through Dr. Frid and Igor Sheiman.

Relative Utilization by Males, Six Oblasts



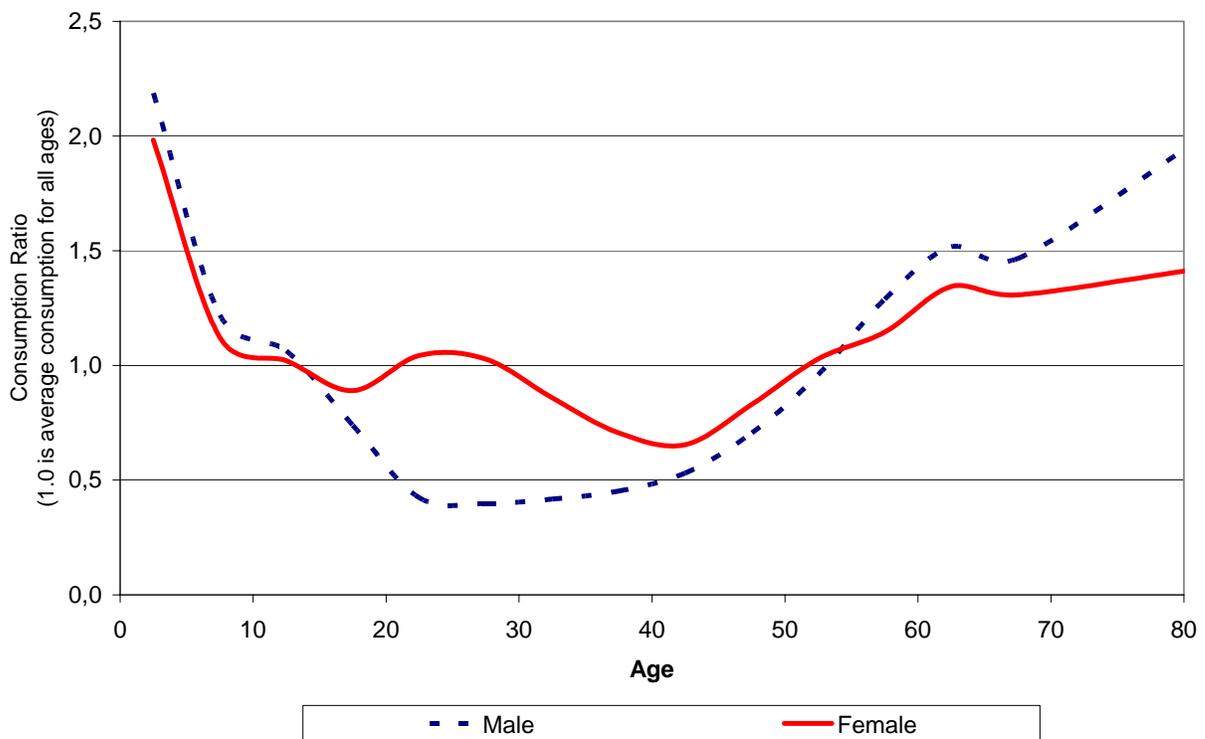
Relative Utilization by Females, Six Oblasts



Utilization falls steeply after the first year of life for both males and females. Males fall below population wide average utilization by age 15, and utilization remains low until age 40, when it starts to rise. This is not surprising, given the burden of cardiovascular disease in middle aged Russian males. For women, utilization does raise some in the child bearing years. However, in the oldest age groups, per capita utilization does not rise as much for females as it does for males. This is consistent with the observation that older Russian women may be less willing than men to leave home for specialist or inpatient care. The rise in the oldest age groups is not as dramatic as in some other populations discussed here. Pensioners who continue to work may also not want to reveal this fact by seeking care in the state-sponsored system.

The exhibit below combines these trends in a single graph to show relative utilization for males and females nationwide¹⁴. The “bulge” in utilization by women of reproductive age is apparent. The utilization by each age group is shown relative to the population wide average. As would be expected due to the smaller cohort sizes, the confidence intervals are larger for children under 1 and the very old.

Combined Relative Utilization Curves



The relationships shown on this curve are summarized in the table below. If an average capitation is set for the entire population by dividing the available budget (perhaps that currently distributed according to a population formula), age specific payments would be determined by multiplying the relative value by the average capitation rate. Payments

¹⁴ Based on a study of 166 million records.

for males 20-40 would be half or less of the population wide average capitation. Payments for children under one would be twice the available average. However, by age 10, payments would fall to little more than the population wide average.

Average consumption rate in Russia is one

Age group	Health service consumption rate	
	Males	Females
1	2	3
0-4	2,1868	1,9829
5-9	1,2197	1,1219
10-14	1,0636	1,0205
15-19	0,7390	0,8900
20-24	0,4223	1,0439
25-29	0,3979	1,0271
30-34	0,4172	0,8586
35-39	0,4520	0,7059
40-44	0,5307	0,6550
45-49	0,7056	0,8299
50-54	0,9590	1,0283
55-59	1,2879	1,1449
60-64	1,5167	1,3440
65-69	1,4650	1,3078
70 and over	1,9390	1,4108

United Kingdom¹⁵

Application

The contract between the National Health Service and general practitioners is an extraordinarily complicated document, running to 103 pages, plus a 170 page appendix detailing the performance measures used in the quality scheme. Basic elements in the contract include a standard capitation for each enrolled patient which is adjusted for the particular situation of the individual practice in relation to the national averages (using the method discussed in Appendix A). This is supplemented by payments for basic practice costs (including acquisition of information systems), fee for service payments for selected services, and the performance bonus payments. Of particular interest to Armenia are the experience-derived adjustments for the demography of the enrolled population, particularly age and sex.

¹⁵ Information in this section is largely taken from the standard contract between the National Health Service (through a primary care trust) and a primary care (general practitioner) practice.

Factors in Formula

In addition to age and sex, the general practitioner reimbursement scheme includes adjustments for the relative burden which a practice incurs due to the following factors:

- Patients in nursing or residential care. These are expected to require 1.43 times the care of those not in care.
- Morbidity and mortality. Where these indicators are worst, the practice gets a positive adjustment through a comparison of local morbidity/mortality indicators to national averages. This is designed both to compensate for differences in typical health status, and to facilitate additional care to offset these inequities.
- Geographic factors. Two are taken into account: differentials in labor prices (London wages are higher), and the extent to which the practice is in a rural area with a widely dispersed population.
- Practice turnover. Those practices that have a relatively large annual turnover (patients enroll or disenroll) receive a positive adjustment. It is assumed that newly enrolled patients will need more consultation and testing so that the doctor has a baseline to manage their care.

In addition, there is an allowance, based on past history, to compensate the practice for the emergency treatment of “out of area” patients not enrolled in the practice.

Age/Sex Adjustment

The general practitioners contract contains the age/sex relatives shown below. The requirements of a male patient age 5-14 are the lowest, and are set at 1, with all other age groups expressed relative to this group. Thus, women aged 45-64 are expected to require 3.36 times the work of a male patient aged 5-14. In Britain, general practitioners provide most maternity and family planning services, thus explaining in part why the relative workload for females of reproductive age is twice that for males of this age.

The basic capitation amount is adjusted each year, and then the capitation payment for each practice is adjusted to reflect the expected workload, using these relatives, compared to the standard national population. Similar adjustments are made for the other factors listed in the previous section.

Age Group	Workload Relatives.	
	Males	Females
0-4	3.97	3.64
5-14	1	1.04
15-44	1.02	2.19
45-64	2.15	3.36
65-74	4.19	4.9
75-84	5.81	6.56
85 and up	6.27	6.72

Uzbekistan

Application

In some ways, Uzbekistan provides useful information for reform of primary health care financing in Armenia. It also inherited a Semashko style primary health care system, although there has been more effort devoted to developing family group practices. Like Armenia, and unlike many other former Soviet countries, there is no social insurance system, so public health care funding is totally dependent on allocations from government budgets. Allocations of Government funds to health care are similarly small; 7.4% of Government spending in Uzbekistan, 8.2% of Government spending in Armenia). However, a greater portion of the economy passes through Government coffers in Uzbekistan, so public health care spending there is 2.4% of GDP, one third more than the 1.5% of GDP recorded in Armenia.

The countries of central Asia have also received technical assistance for health reform from a USAID sponsored project (Zdravreform and its successors). This has funded research, including the study which generated the age and sex based rates of relative utilization shown here. Russian consultants who have worked for the Zdrav project confirm that these relative utilization rates are similar to those in other Central Asian countries¹⁶. With the exception of the high levels of utilization by women of reproductive age associated with higher fertility rates, these utilization relatives are similar to those observed in Russia.

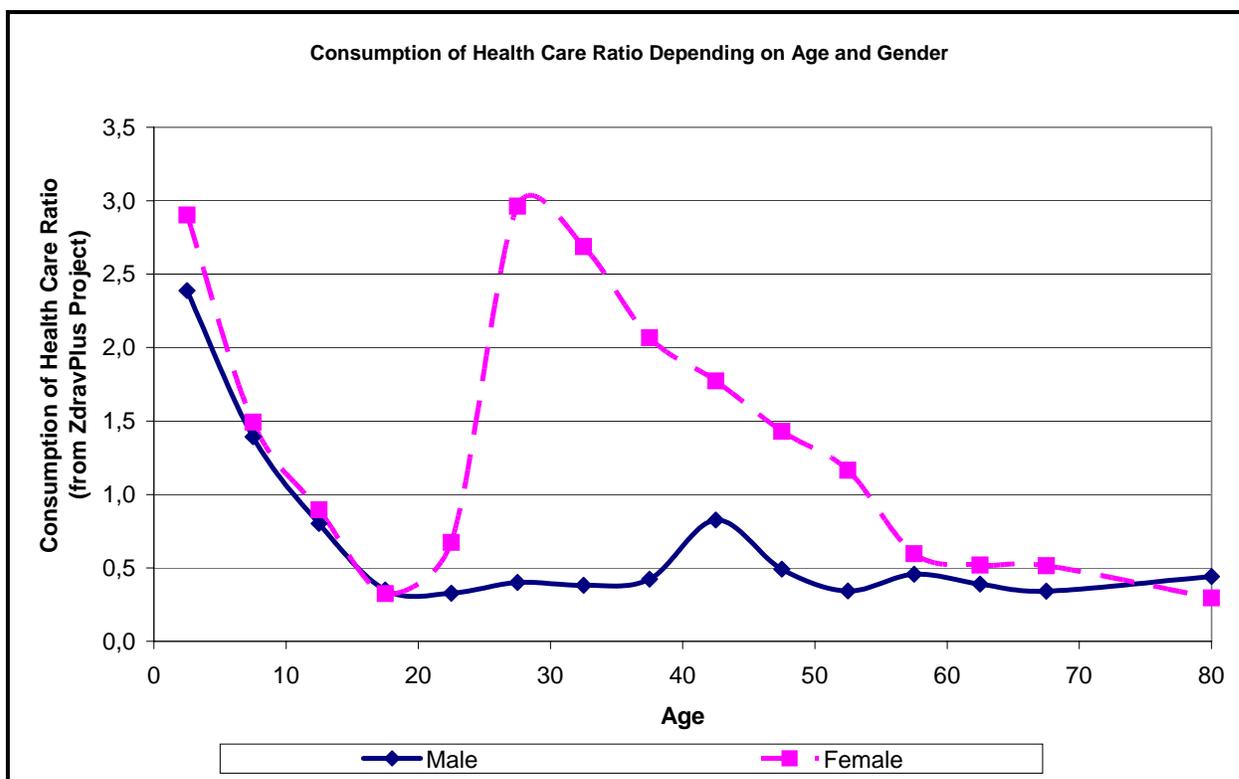
Age/Sex Adjustments

The table and graph below shows the relative per capita utilization coefficients derived in Uzbekistan. The high relative rates of utilization by women from 25-35 reflect the much higher birth rate in Uzbekistan. The large number of prescribed pre-natal visits produces a large spike in utilization in women who are bearing children. Total fertility (births per woman) in the country is 2.6, twice the TFR of 1.3 reported for Armenia in 2006¹⁷. In Mongolia, these relative utilization rates could be adopted with relatively little modification because the birth rate is similar. In Armenia, a lower “spike” in utilization by women of child bearing age would be more appropriate.

¹⁶ Personal communication; Edward Frid.

¹⁷ Data from WHO Statistical Information System

Age Group	Consumption of Health Care Ratio (from ZdravPlus Project)	
	Male	Female
0-4	2.3874	2.9036
5-9	1.3930	1.4922
10-14	0.8025	0.8953
15-19	0.3502	0.3252
20-24	0.3271	0.6727
25-29	0.4010	2.9628
30-34	0.3818	2.6885
35-39	0.4236	2.0667
40-44	0.8260	1.7726
45-49	0.4908	1.4298
50-54	0.3422	1.1645
55-59	0.4563	0.5976
60-64	0.3904	0.5193
65-69	0.3419	0.5145
70 and more	0.4413	0.2952

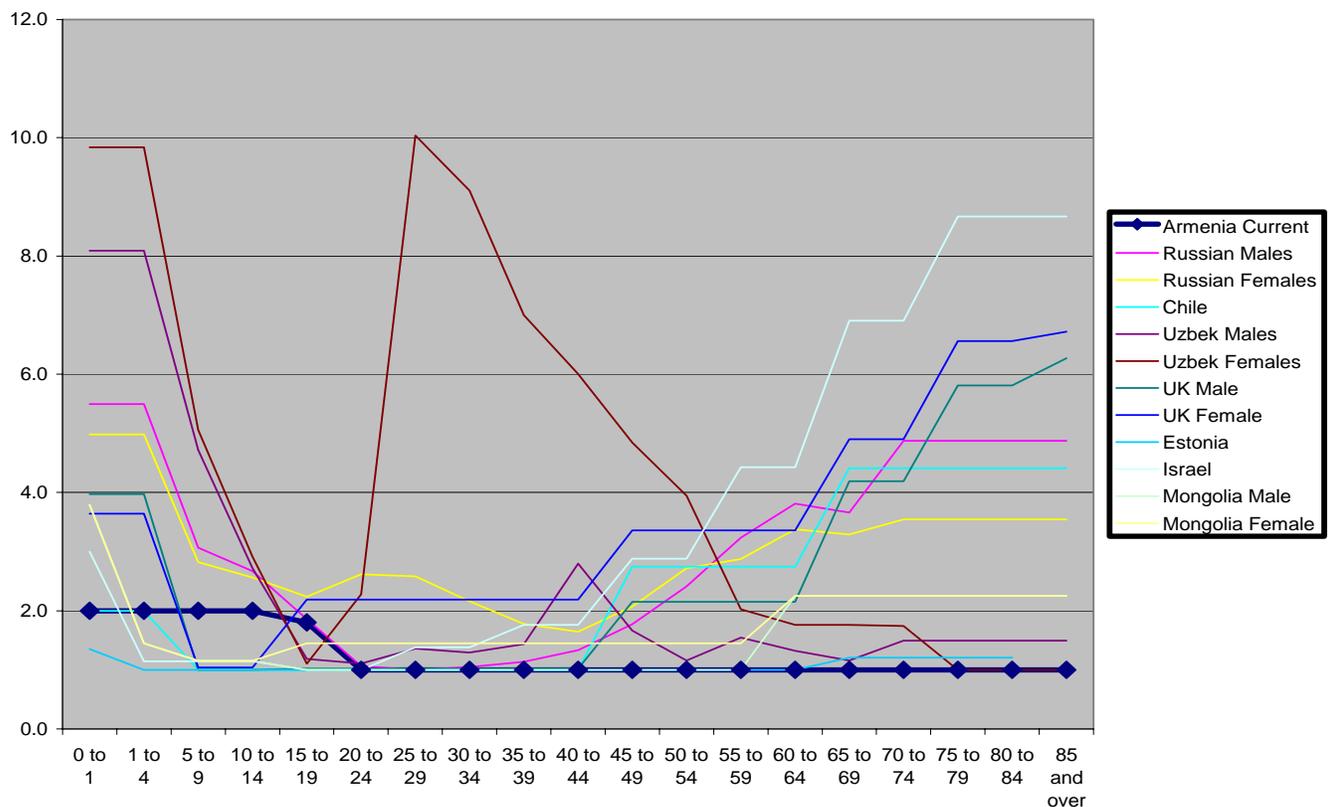


F
Consumption of health care by age and gender, Uzbekistan. Source: ZdravPlus project.

V. ANALYSIS

Comparison of data or formulas from other countries suggests that the current Armenian formula for payment of primary care facilities overcompensates for care of children, and allows insufficient funding for the needs of the elderly (now 30% of the population).

The graph below plots the relative utilization implied by current age adjustments or the studies discussed above, and compares with the relative utilization implied by the current Armenian capitation system. Relative utilization values are shown for Armenia (both sexes combined), Russian males and females, Chile (both sexes), Uzbek males and females, UK males and females, Estonia (both sexes), Israel (both sexes), and Mongolian males and females. Where the Mongolian relatives differentiated by income, we used the values for the poor. Where utilization rates split part way through an age group (Armenian rates shift at age 18), we averaged the implied utilization for the age group assuming an equal number of individuals in each year of the five year cohort. In all cases, the lowest utilization of any population group is set at one, and the utilization of other groups is set as a multiple of this. Armenia is the broad blue line with diamonds.



Relative Utilization by Age Group (8 Countries)

In almost all countries, the lowest utilization occurs among teen age boys or young men. The one exception is in Uzbekistan, where the oldest females actually use slightly fewer services than the young men. Where utilization rates are differentiated by sex, women of

reproductive age use more services. In Israel, maternity services are paid separately, making more plausible the use of the same age specific utilization assumptions for men and women of reproductive age. In Uzbekistan, the huge spike in relative utilization for women 25 to 35 presumably reflects the fact that these women are continuing to have additional children, while females in other countries may have stopped childbearing.

Several patterns are immediately apparent in this graph. There is relatively little differentiation in the relative utilization implied by the Armenian primary care formula. The expected utilization remains constant from age 18 for the rest of the life, and is assumed to be half the average for children up to age 18. There is no allowance for the increase in utilization with age that is seen in the West (UK, Chile) and in Russia (to a lesser extent).

The other major difference apparent is the utilization by very young children. In almost every country, the data show utilization by the very young (less than one or two) much higher than that for older children, and several times the utilization by the lowest using age group. This is consistent with the requirements for preventive care (immunizations, well baby visits) and curative care seen in all countries. Russia finds that utilization by infants is 4-5 times that by young men, the British system anticipates babies using 3-4 times the services required by the lowest need group. In Uzbekistan, the youngest children are assumed to need up to 8 times the care required by young men.

The West (Chile, UK, Israel) show a much steeper increase in implied need for the very old. This is less pronounced in Russia, but still the oldest Russian males use five times the services required for the lowest use group (men 25-34). Russian women use somewhat fewer services than their surviving male compatriots, but their utilization is still 3.5 times the lowest utilization group).

VI. ADJUSTING FOR AGE AND SEX IN ARMENIA TODAY

Armenia does not have the data needed to derive the kinds of utilization curves shown for Russia, the UK, Chile, Uzbekistan or Israel. There is no age/sex specific outpatient utilization data and this will not be available nationally until the MIDAS III system has been successfully installed and running for at least a year. And utilization has been depressed historically by the out-of-pocket costs of services. However, there are several conclusions that can be drawn about reform of the current primary care payment system:

- Insufficient allowance is made for care of the old (over 60). Thirty percent of the population is now over this age. Data from every system (with the exception of Uzbek females) shows the higher need in these groups, which is consistent with the increasing prevalence of chronic disease with age. The Ministry of Health worries that primary care centers would have an incentive to avoid enrolling patients in these groups. The problem is graphically illustrated by the chronic shortage of funding for essential drugs for entitled pensioners. The per capita normative used in setting budgets for drugs for adults is half that of the normative for children under 7.
- The flat allowance for all children under 18 is too generous for older kids, and probably inadequate to reflect the burden of care for infants.

- There is a strong argument to be made for increased utilization by women of reproductive age. Some of the need for this adjustment is offset by direct payments for maternity services, and the “pre reproductive” allowance for teen age girls. With current Armenian fertility, there is no need to reflect the remarkable differences seen in Uzbekistan.

Clearly, a range of values for expected utilization can be justified from the available data from other countries. Too many age divisions will complicate the reimbursement process for primary care facilities. Still, it seems reasonable to provide differentiated capitation for at least the following groups:

- Children under 1 or 2
- Male and female children between this age and 15 (with a possible additional category age from 1 or 2 to 5)
- Males aged 15 to 40
- Females of reproductive age (15-40)
- Males and females 40-60
- Males and females 60 and over
- Possibly a separate grouping for the very old (>70 or 75)

The most appropriate experience to use as a single guideline is probably that from Russia. Twenty years ago the health systems were essentially the same. Medical training and “medical economic standards” (protocols) were the same. Fertility in Russia is also low. The population is aging rapidly. Russia is somewhat less constrained in its funding of health care, so the economic barriers to access are lower than they have been in Armenia in the recent past. Using the Russian experience as a guide, we will use the following relative utilization figures to derive capitations for payments to the enrolled population in Armenian primary care facilities

Population group	Utilization relative
Children under 1 year	7
Children 1-4	4
Children 5-14	2.8
Males 15-39	1.0
Females 15-39	1.7 ¹⁸
Males and Females 40-59	2.2
Males and Females 60 and over	4.0

We can adjust the “capitation unit” so that the new formula is budget neutral on a national level. We multiply the relevant population groups by the relative utilization to get total equivalent utilization units, and then develop a price for the basic unit (allowed for males 15-39) which, when used in conjunction with these relatives, will produce a capitation scale that results in the same total expenditure as the existing formula. The author and PHCR staff have developed a spread sheet which enables us to calculate this amount¹⁹, and then to calculate the difference between the existing payment scheme and a proposed scheme for different enrolled populations.

¹⁸ Assumes continuation of the maternity voucher system, with a sizeable payment to the facility for every pregnancy managed.

¹⁹ This analysis uses annual payment rates of 2,882diram for children under 18 and 1,441 diram for all enrollees over this age.

“Budget Neutral” Annual Per Capita Payment for Basic Physician Services (Option One)

Children under 1 year	7	
Children 1-4	4	
Children 5-14	2.8	
Males 15-39	1.0	
Females 15-39		1.7
Males and Females 40-59	2.2	
Males and Females 60 and over	4.0	

The table immediately below shows the annual amounts that several different primary facilities in Armenia would receive for their current enrollees from the basic capitation under the existing scheme (Column 2), and under the planned scheme (Column 3). This is compared to the current baseline, in which 1,441 drams per year is paid for adults and 2,882 for children under eighteen. The baseline amount and the options are calculated for the enrolled population, NOT the catchment area population

Income from Basic Capitation Allowance (, 000 dram per year)

Facility	Baseline	Option One	Option Two
Yerevan, PC 17	80,834	86,185	85,194
Yerevan, PC “Armenia”	112,280	113,746	113,585
Gegarkhunik, PC “Sevan”	37,622	36,767	36,871
Lori, Vanazdor PC 4	28,246	28,883	28,803
Armavir, Haytagh MA	4,764	4,652	4,691
Armavir, “Balahovit” MA	6,115	5,953	5,920

Of course, slightly different relatives can be justified from the analysis of other countries. Depending on what services are paid separately (such as maternity), more or less of a differential can be justified for different groups. Column 4 in the model assumes different patterns of relative utilization (shown immediately below). In this option, there is more differentiation for the very old, a single payment relative for children under 5, and a lower differential for children age 5-14.

**“Budget Neutral” Annual Per Capita Payment for Basic Physician Services
(Option Two)**

Children 1-4	5	
Children 5-14	2.0	
Males 15-39	1.0	
Females 15-39		1.7
Males and Females 40-59	2.2	
Males and Females 60-69	3.0	
Males and Females 70 and over	4.5	

The Excel model can be used by PHCR staff to test a variety of assumptions about alternative utilization. The variations between the baseline amounts (using enrolled populations and the current two tier basic capitation) and these two options are relatively small. In Option One, payment changes range from an increase of 6.6% to a decrease of 2.6%. In Option Two, the clinic that is the biggest “winner,” Yerevan PC 17, gets somewhat less.. But the net changes are very similar. The important difference is at the margin: there is less reason to avoid intrinsically high cost cases. In the event of a baby boom in the enrolled population, the clinic income will rise more rapidly under Option One. If working age adults emigrate, leaving the elderly in the care of the polyclinic, the clinic income will fall less rapidly in either option than in the baseline.

One key question in developing a new capitation is how to handle the amounts currently paid with respect to narrow specialists. It is the author’s considered opinion that these amounts should be put into the “capitation pool” from which the capitation unit is calculated. Most large polyclinics will be well served by this method. Facilities that cannot offer the basic “narrow specialist” services could have their budgets reduced from the calculated figure. Or they could be responsible for paying for basic referral services normally handled by “narrow specialists” on polyclinic staff.

The changes in payments to most facilities should encourage them to better meet the needs of their patients. But the change will not be dramatic, as shown above. It would not appear to be necessary to phase a transition from the old formula. Shifting to payment by enrollment will have bigger effects. But if there is a desire to “ease the transition” to a new capitation schedule, the available budget could be divided into two segments (the weight to be determined), with one pool allocated according to the new formula, and the other according to the older, simpler formula. Over time, the proportion of funding available in the “new capitation” fund can be increased, and that in the “old capitation” fund can be decreased. This is similar to the incremental transition mechanism suggested in the past for the shift to payment by enrollment.

VII. FUTURE ADJUSTMENTS WHEN MIDAS III SYSTEM IS AVAILABLE

When the MIDAS III system is fully operational, the State Health Agency should have the data necessary to calculate the number of primary care visits for each patient, and therefore for all patients of a particular age and sex. Because the MIDAS III system has been designed to cumulate certain visits in a single encounter form, care must be taken to focus on the total number of visits (which is recorded on the form), not the number of “encounters.”

Unfortunately, the MIDAS system will not permit direct calculation of total primary care expenditure. While the encounter form indicates tests and drugs prescribed, it does not record the approved cost for these items. Under current policies, only some patients are entitled to receive these items for free through the polyclinic. Even where there is an entitlement to an essential drug, the individual may be forced to buy the drug in the market if the facility has exhausted its global drug budget. Special studies could be done using the MIDAS III data, attributing standard Government fees to prescribed services. In this way, SHA can determine what it would cost to fully meet the need for drugs and services prescribed to the population. However, these total cost studies will have to be done “off line” by SHA or a health services research agency.

Utilization relatives based on visits can be calculated from the national MIDAS data by aggregating all visits for patients of each age group, and then developing relative utilization numbers. The average number of visits for the entire population is divided into the average in each age group to obtain the relative utilization for that age group. This is then multiplied by the total population in the age and sex group. These amounts are summed, obtaining the total utilization indicator for the entire population. This is then divided into the available budget to determine the value of a capitation unit. The “capitation unit” is multiplied by the utilization relative for a particular age/sex group to determine the amount a facility will be paid for one patient in that group. This “age/sex adjusted” capitation amount is multiplied by the enrolled population in the age/sex group, and the totals added to determine the annual capitation payment to the facility. Assuming payments are made periodically, the facility payment can be adjusted up or down by changes in enrollment with each periodic payment.

A simplified example follows using five age groups. However, the methodology can be extended to as many age/sex groups as considered desirable.

Age Group	National Population		Total Visits		
	M	F	M	F	Total
0-4	10,000	10,000	60,000	60,000	120,000
5-14	20,000	20,000	30,000	30,000	60,000
15-39	40,000	40,000	42,000	65,000	107,000
40-59	20,000	25,000	30,000	52,000	82,000
60 and over	20,000	30,000	60,000	90,000	150,000
National	110,000	125,000	222,000	297,000	519,000
Total	235,000		Average Visits/Person = 2.209		

If the available budget were 500,000,000 dram, the capitation unit would be 2,127 dram (the amount that will be paid, on average, for each Armenian).

From the data above we obtain the following relative utilization numbers. First, we divide the number of visits in the age group by the population in that group. That frequency is

divided by the average utilization for the entire population (2.209 visits per year) to obtain the relative utilization factor. This is multiplied by the “capitation unit” (2,127 dram) to obtain the amount to be paid for each enrolled patient in the age/sex grouping. In the example, the population relative varies from 2.72 in the youngest children to 0.48 in males from 15-39. Per capita annual payments would range from a high of 5,786 for the youngest children to 1.021 for young men.

Age Group	Average Visits		Utilization Relative		Capitation Payment	
	M	F	M	F	M	F
0-4	6	6	2.72	2.72	5,786	5,786
5-14	1.5	1.5	0.68	0.68	1,446	1,446
15-39	1.05	1.625	0.48	0.74	1,021	1,574
40-59	1.5	2.08	0.68	0.94	1,446	1,999
60 and over	3	3	1.36	1.36	2,893	2,893

Each year, the capitation unit can be recalculated using the national budget and population. The relative population can be updated periodically using data available from the MIDAS. To avoid double counting, it will be necessary to adjust the visit figures for any services that are paid for on a fee for service or per case basis, such as the payments currently being made for ante-natal care from the maternity voucher.

As the MIDAS data base becomes more reliable, it is possible to add additional dimensions to the capitation payment. For example, utilization relatives could be developed for subgroups within an age or sex category. The most obvious might be disability status---which is likely to cause an increase in utilization. Disability designation is recorded during enrollment. Utilization experience by those who are disabled in each age/sex bracket can be compared with those who are not. A larger matrix can be constructed of the capitation payments. Or a “disability multiplier” can be developed to adjust age/sex specific utilization. Thus, if the disabled generally use twice the services of others in their age group, the age adjusted utilization for this group would be doubled and included in the first calculation---of the basic capitation unit. Age/sex specific multipliers can then be multiplied by the “disability multiplier” to obtain the payment made for disabled persons in each group. While this matrix process is probably easiest to understand, a single multiplier for each practice can be developed taking into account all of the relative utilization factors. This methodology is described in Appendix A.

APPENDIX A. CALCULATING UTILIZATION RELATIVES FOR A PARTICULAR POPULATION

Age and gender breakdown for a territory within a country, or any segment of a population R_{AG} , is calculated using this formula:

$$R_{AG} = \frac{\sum_{i=1}^{30} P_i^C \cdot R_C^i}{P^C}$$

P_i^C -size of the age and gender group i in the territory (catchment area)

P^C - total size of the population (catchment)

R_C^i - rate of health service consumption (utilization relative)

Summation is carried out for all age and sex groups. If calculated for the entire country, the age/gender coefficient will equal one. The value for the enrolled population or catchment area indicates the extent to which the expected utilization in the area is above or below the national per capita average.

Similar calculations can be done for additional variables (such as disability) in a multiplicative formula. For example, a factor can be added, that will change financing based on the number of chronically ill requiring costly treatment (living with AIDS, number of disabled), without having an impact on other factors. The relative value specific to the population of each facility----age and gender is shown above----can be multiplied by the additional relatives for other factors and by the basic capitation unit to determine the adjusted capitation to be applied to the entire population served by the facility. These multiplicative formulas have an important property – each factor can be calculated independently, which means this formula can be easily modified, improving quality of future expenditure predictions.