1) Specialists Training on Medical Technology

Before the break-up of USSR engineers and medical technicians were trained in cybernetics and medical instrument-making departments of medical institutes in Leningrad and Kiev as well as at the base of Fergana branch of Tashkent State University. Middle medical staff was also trained in the branch of central institutes of higher education in Tashkent. In the beginning of 1990-s training of this category of specialists was stopped. Only last year it was decided to restore the enrollment to the Republican medical electro-technical professional school on "expert in installation and technical running of medical equipment" specialty. Also it was decided to open magistracy in Tashkent State Poly-technical University on medical instrument-making and equipment. Bachelorship on such specialists training is not yet opened and is in process of approval. Advanced medical training system (formal education) for the above stated category of specialists is absent.

2) Higher Education Training of Pharmacists

Pharmacy training is fulfilled on the base of Pharmaceutical Institute and plans for a 2 level training are as follows: Bachelorship for 5 years and magistracy during 2 years, but not all the spheres are submitted yet, particularly, there is no magistracy on pharmacy. The institute conducts large-scale work on training process improvement and is bringing up standards to comply with market and pharmaceutical industry requirements. Presently students are trained on 5 areasareas: pharmacy, professional education – pharmacist, industrial pharmacy, bio-technology, agronomy. The institute collaborates with foreign educational institutions as well as with commercial organizations, at the same time, conducts research work involving students and master degree holders together with post-graduates, which significantly increases the quality of training process.

(3) Advanced Medical Training

Advanced medical training is fulfilled in the system of Ministry of Health of the Republic of Uzbekistan by the Tashkent Institute of Postgraduate Medical Education (TIPME), which trains 10-12 thousands doctors annually as well as in departments of advanced medical training of doctors of Samarkand and Andijan medical institutes. A number of doctors train in the institutes of higher education and clinics of Russian Federation. Also several international organizations (WHO, UNICEF, USAID, etc) organize trainings and workshops for healthcare workers on different problems at the local level. Initially,

advanced medical training system was voluntary. Presently, by the Decree of the Ministry of Health, the medical doctors must get 288 credit-hours in compulsory training every 5 years. Yet the system of voluntary certification with receiving of qualification degree is operating. Presently there is a work on implementation of obligatory licensing system, the Republican Center on licensing and certification of doctors and pharmacists have been established. However it is not obvious whether work and the projects are included in the grant of license and the calculation of education hours to be considered for credit.

From the data provided by RIAC there is no evidence that the significant part of presently practicing doctors underwent advanced medical training during 10 and more years. Moreover, according to an existing regulation, specialists with work experience for not less than 3 years can undergo an advanced medical training in the TIPME and in departments of advanced medical training. This does not appear to comply with modern strategy of continuous professional education, which is the training process after qualification and significant amount of practice. In this regard, it is necessary to review the concept of TIPME and Departments for advanced medical training as well as the aims and goals and re-develop its programs and curricula. It is necessary to implement modern educational methods, including distance learning. It is important to introduce the programs and approaches that could consider individual needs of every specialist.

The sphere of middle medical personnel advanced training faces serious problems. Presently insufficient methodical work and the absence of educational and methodical literature as well as low quality of educational programs and absence of trained lecturers lead to the low quality of students' training. Visits to regional medical professional schools revealed that, in spite of material and technical supply issues solution and bringing them in accordance with modern requirements, it is necessary to fulfill large scale activity on staff training, institutionalization of mentorship, development of educational and methodical literature. The detailed, comprehensive analysis to define the further strategy to develop this kind of professional education is necessary to find the possibilities for support given the conditions of low financing.

One of the key targets of further educational reforming stage should be the establishment of continuity between all levels of education and strengthening of social partnership. It is important to hold the work on improvement of middle medical personnel status as among healthcare workers so as among population as it was announced in the developed concept

of the healthcare reforms.

The problem of the advanced training of nurses is connected with the absence of flexibility of formal education and insufficient accessibility due to the geographic distance as well as economic constraints. In order to resolve these problems, at-site informal education is organized under support of heads of medical institutions. The examples can be the creation of Nurses Council in Fergana Branch of Republican Emergency Center, which provide continuous advanced medical training for nurses as the Center itself has rayon medical facilities under its supervision. Educational materials are developed for monthly training course organized jointly with the Association of nurses and the department of organization, management and economics of healthcare of Tashkent Institute of Post-graduate Medical The program also includes Education for senior nurses of leading curative and preventive facilities.

(4) Over-all Assessment of Education and Training Programs

The Ministry of Health and educational institutions conduct large activity on development and introduction of training programs and knowledge evaluation systems using international experience and own skills. As it was mentioned before, Tashkent State Medical Institute-1 established the Center for methodical guidelines and training technologies, and the collective of Tashkent State Medical Institute-2 is constantly developing and publishes educational, methodic and training text-books for lecturers of higher medical institutions. Presently there are 13 titles of training materials on training methodology and knowledge evaluation. Such system of knowledge evaluation is introduced in stages.

However, there are several constraints that should be resolved at further stages of medical education reforms.

1) There is a necessity of close collaboration with main owners (curative and preventive facilities) in order to determine the needs of practical healthcare among high-qualified staff and brining training programs and plans as well as the system of knowledge evaluation up to a compliance with them.

2) There is a need to acquaint SSVI (specialized secondary vocational institutions) with training programs of higher medical institutions to optimize learning experience and

determine the structure and study hours needed for staff training. Presently the Ministry of Health together with rectors of higher educational institutions discuss the issue of the training program development for pre-diploma training of medical students based on the block-module principle.

3) More development is needed for program and training plans for nurses at higher education levels after determining of tasks and goals for this category of specialists and formulating of educational institutions' mission in this sphere.

4) An assessment of the system of testing and test questions showed, that a major part called for knowledge evaluation of the 1st level (memorizing), sometimes for understanding (2nd level) and less frequently to use own knowledge (3rd level of knowledge). This problem appears to be typical for all higher educational institutions of the Republic, which can be monitored while analyzing tests for entrance examinations.

5) Lecturers do not always manage the methodology of composing the test questions. Higher education institutions emphasize the form of OSCE (Objective Structure of Clinical Examinations), rather than the substantial part of the examinations. There is a necessity in large and constant work at lectures on familiarity with interpretation of modern principles and methods for training, and knowledge evaluation.

8.3.2 Educational Management

System of education management is still centralized. The Cabinet of Ministers, Ministry of Health, Ministry of Higher and Specialized Professional Education are institutions in charge for education management of higher medical institutions. The Cabinet of Ministers, Ministry of Health, Ministry of Higher and Specialized Professional Education, participate in management of secondary specialized educational institutions. Oblast Khokimiyats, through the budgets which finance medical professional schools and colleges also have a significant participation in management of education. There are nongovernmental organizations such as Medical Higher Education Institutions' Rectors Board and Medical Colleges and Professional Schools' Directors Board. In accordance with the Law "On Education" the Cabinet of Ministers line of responsibility in the field of Education are:

a) Unified national educational policy implementation,
b) Management of educational governing bodies,
c) Development and implementation of the education programs;
d) Determination of order for establishment, reorganization and liquidation of the educational institutions;
e) Determination of order for educational institutions accreditation,
f) Certification the faculties members;
g) Licensing the educational institutions of the other countries to obtain the right to teach on the territory of Uzbekistan,
h) Approving the educational certificates of standard form, etc

The Department of Human Resources, Science and Educational Institutions of the Ministry of Health is the main authorized body, governing and monitoring medical education. According to the law "On Education" Art.26 the terms of reference of The Department of Human Resources, Science and Educational Institutions of the Ministry of Health are:

a) To implement the unified national medical education policy;
b) to coordinate activities and to implement the methodical administration of the educational institutions, i.e. monitoring of the undergraduate education of physicians, pharmacists, midlevel medical personnel, postgraduate education of physicians and pharmaceutists and medical technicians engineers, PhD education (Aspirantura, Doctorantura), advanced professional training of all the medical workforce;
c) to facilitate the implementation of the national educational standards, requirements to the level of education and quality of professional training;
d) to implement advanced form of education and new pedagogical technologies, technical and informational tools of education into the process of education;
e) to organize developing and publishing the educational, and educational and methodical materials;
f) to approve the final state certification of the students and trainees and the extern in the educational institutions;
g) to organize education, improvement of professional skills and re-training of the pedagogical personnel, etc.

Medical education management system is rather complicated and being provided by the

various institutions, mainly on the Republican level, and the Department of Human Resources of MOH coordinates these activities. Rectors (Higher Education Institutions) and Directors (Secondary Specialized Education Institutions) manage the educational institutions. The Rectors of the HEI and Directors of the colleges are appointed by the Cabinet of Ministers on the competitive basis, upon the introduction of the MOH. Rectors of Institutes and colleges Directors are of double vertical subordination, i.e. they are subordinated to the Cabinet of Ministers and to the MOH. Directors of the Medical Professional Schools shall be appointed by the MOH Decree.

In the Republic of Uzbekistan a range of legal documents on education was adopted. The main documents i.e. Decree "On Education" and "National Program for Personnel Training" were adopted by Oliy Majlis in 1997. In 2001 Resolution of the Cabinet of Ministries "On National Educational Standards of Higher and Secondary Specialized Education approval" was adopted. The National Standards are the main documents to develop educational curricula. By introduction with these deeds for secondary vocational specialties some inaccuracies have been revealed the specialists confirmed in their interviews. Hence there is a necessity to correct them in the next editions to avoid problems with the development of educational programs.

During the survey, there is the undergoing process to comply with the provisions of the Decree. Besides, there is a range of intradepartmental decrees, provisions, resolutions and other legislative documents, regulating educational process. A preliminary assessment with the legal base regulating medical education issues, showed the necessity of the special survey and analysis, aimed in studying a range of contradictory provisions in various documents, as well as further bringing them in line with each other.

To provide the quality of education all the educational Institutions must be accredited, that would be a ground to obtain a license on educational activity. At present, upon the registration the educational Institution in authorized bodies, the license with right for education activities is being issued by the Khokimiyats. Accreditation must be done by the Department for Certification of Educational Institutions and Human Resources Training Quality Control at the State Examination Centre of RU. However, presently, the criteria for accreditation of the Educational Institutions have not been created yet, and there is no one HEI that has received an authorized certificate. In the Republicthe, the certification of HEI was done through examination. The quality of education can be improved by the

competition on the educational market, which is a very important factor, both amongst Higher and Secondary Specialized Educational Institutions and faculty members. At present, there is no any competition in reality, and the quality of education shall be defined by the geographic location.

The program of medical education is unified in all HEI and approved by the Human Resources, Science and Educational Facilities Department of the MOH and the Ministry of Higher and Secondary Professional Education. In 2001, the Centre for the Methodological Development and Educational Technologies was established on the base of Tashkent State Medical Institute –1 by the Rectors Board of Medical HEIs, to improve and work out the legislative documents in the field of higher education. The Centre is mandated to fulfill the Decree of the Cabinet of Ministers No. 343 (dated August 16, 2001) to evaluate the numerous educational programs which include the following: 7,000 for Bachelor's degree (or undergraduate higher education level), more than 3,000 programs for higher nursing qualifications and 71 programs in 32 directions of the masters' degree levels. Standards and curriculum are to be approved by the Center.

8.3.3 Financing of the Medical Education

(1) Financing HEI

HEI financing is being implemented at costs of the MOH budget and extra budget funds. Mainly, the budget covers expenditures on salary, scholarships, mother allowances, taxes, as well as payments of utilities, etc. In 1999 it was an amount 1,610.3 thousand (1bln. 610 mln.300 thousand) sum, in 2000 – 2,286.2 thousand, in 2001 – 3,186.4 thousand, in 2002 – 4,462,9 thousand. The main extra budget source is payments from students. In this year the cost of the 1 year study is 482 000 sums per student, and it is equal for all medical institutes.

According to the existing legislations, (the Presidential Decree #1213 from 16 Aug. 1995. The resolution of the Cabinet of Ministers of the Republic of Uzbekistan #414 from 3 Sept. 1999 "On improvement the financing order of budget organizations" and the resolution of the Cabinet of Ministers # 490 from 30 Dec. 2002) HEIs, like other budget organizations can make additional payments and present awards to the teachers-professors staff from out-budget funds: from the fund of financial motivation till 25 % and from the fund of budget organization development till 15 % can be spent on these aims. At TashMI-1 a

rating system of teachers' performance was adopted. Teachers are being regularly evaluated, and according to the results of estimation if they meet the criteria, which include the students' progress of study, and according to the results of yearly attestations, they receive the salary increases. Similar systems of incentives are used in Samarkand Medical Institute. In December, there was a competition amongst the professors-teaching staff. Bonus payments are paid differently (up to 100% of additional benefits to the salary) depending on the score attained from a set of criteria.

Almost all the expenditures for maintenance and updating of the educational and technical base, methodical literature publishing, and other expenses on the educational process are covered by the non-governmental funds. However, not all the HEI are in the same situation.

(2) Financing of Colleges and Medical Professional Schools

Financing of colleges and medical professional schools is being implemented from the local authorities' (Oblast Khokimiyats) funds, and for the colleges from the budget of the Ministry of Higher and Secondary Professional Education. As far as there is private tuition (student payments) in colleges and professional schools, they have their own non-governmental funds. Educational facilities are categorized according to their scope of activities and level of funding. The cost of the 1 year training is 80 000 sums per year in the 2002. In this connection, salaries of the teachers will depend on the educational category the college belongs to. Salary of the college teacher can exceed salary of professional school as much as 1.5 times.

Unlike other educational facilities, medical vocational schools for advanced re-training of middle level personnel are financed from the MOH budget. In this connection salary is the major part of the expenditures. Extra budget fund is not significant, because the medical facilities cannot pay for re-training of their staff as they have no budget items to cover these expenditures. Although there is a special item of any facility's budget spending, named "Education expenditures" (cod 01765), the Ministry of Finance virtually allocates no funds for these purposes. The same situation is observed in the sphere of doctor staff qualification upgrading. In the last years, budget curtailment has made it impossible to pay even traveling expenses of workers during their re-training. Hence medical workers would spend mainly their own money for this purpose, and it has become the important challenge for re-training and professional development system, together with real economical incentives that stimulate medical workers to raise their qualification. Material

and technical base of these educational facilities do not meet the requirements and demands of the students.

The quality of buildings and re-equipping of medical colleges and vocational specialized schools are major challenges. Even as new buildings may have been constructed, they do not satisfy the requirements and standards for secondary vocational educational facilities. The lack of medical equipment for study purposes in many colleges and specialized vocational schools is also a serious problem. The quality of student training, particularly in the clinical fields, suffer from these limitations

(3) Private Financing of Medical Education

Increasingly, students are paying for their own education, which become sources of off-budget funds for use by medical institutions to augment salaries and material base of teaching. At present, financing for magistracy and clinical residency is largely borne by students. This could account for a lot of graduates in undergraduate levels no longer proceeding towards specialization. As costs increase and public budget support decline, there is a likelihood that enrolment in medical schools and higher education will decline. This will have implications on access of the population to health care.

There is at present no middle system for those who cannot be supported from budgets and those who cannot pay privately. In other countries, a system of grants and credits is available. Those deserving to enter medical education but without necessary fund support can apply for grants from grant-giving bodies, mostly non-government organizations or special government programs, for minority groups for example. This support is paid back in terms of service in areas considered by the granting body, usually rural areas. Credits on the other hand entail borrowing money from institutions and paying back the amount within an agreed period.

8.3.4 Scientific Education

For September 2002, MOH system had 15 Scientific and research institutes, 20 scientific centers and 11 institutes of higher education in its function. According to the Department for human resources, science and educational institutions during 1992-2001 in the Republic were supported 226 doctorial theses and 1350 PhD thesis. Distribution of scientific potential on institutions as well as on age groups is shown in tables of Annexure.

From the 1st January 2003 there were 560 doctors of sciences and 2315 candidates of sciences working in the country. Scientific and research work in medical institutes of higher education is held by 428 candidates, 75 people working for doctor's degree. During 2000-2002 Medical Institutes of higher education trained 42 doctors of sciences and 189 candidates of sciences, in Scientific and Research institutes and centers – 23 doctors of sciences and 271 candidates of sciences. In total, 65 doctors of sciences and 460 candidates of sciences. The number of thesises, defended for the last 10 years from 1992 to 2001 is shown in Table 8.2.

Table 8.2 Number of thesis defended in the system of Ministry of Health in the Republic of Uzbekistan 1992 to 2001

Years	Doctor thesis	Candidate thesis
1992-1993	18	123
1994	35	192
1995	31	178
1996	18	123
1997	9	111
1998	28	138
1999	32	168
2000	32	145
2001	23	172
Total	226	1350

Comparative analysis of the teaching human resources and scientific resources in the HEIs, Research Institutes and Scientific Centers has shown that in the major part of them the problem of growing old the human resources and lack of young specialists is the key one.

This process is motivated primarily by the possibility of carrier, as far as to the major part of governing positions both in the facilities of Health, especially in big cities, and in the system of Health Management, the priority is given to the PhDs and Doctors of Sciences.

The scientific works are approved in Scientific Boards of the leading scientific centers and institutes, and they are defended in a range of specialized Councils, organized by the Highest Licensing Commission (HLC). Final awarding the scientific titles and degrees is been done by HLC in different fields – scientific fields. This system of multi-staged expertise is worth, because it is oriented to the support of necessary level of scientific works.

It is necessary to mention, that a lot of applied scientific researches do not have a wide

range of implementation and being used in the facility where they where created.

In the scientific sphere the system of mentorship is widely used, when the scientific consultants and the chiefs of scientific works are teaching the young specialists the ways of making the survey. However, for these mentors there is no another motivation except moral. There are not special courses, where the competitors would be taught the proper planning, conducting, analysis of scientific works in medicine, and level of young human resources training in major part depends on the scientific mentor. One of the problems of scientific surveys is also limited access to the scientific literature and information, including Internet, particularly because of the absence of financial opportunities and bad command of English of the major part of the researches.

According to the Decree of the President of Uzbekistan dated 20 February 2002 "On improvement of scientific and research activity organization" budget financing of scientific institutions will be made basing on grant contract concluded with organization or research team. Thus, next year 156 projects will be financed for the amount of 962 million. 486 thousand sums. As a whole in financing the medical sciences it is necessary to mention three core problems: the lack of finances for the scientific researches, not effective utilization of the fund provided at the point of view of clinical practice, not enough effective system of planning and distribution of the allocated means. With very seldom excluding the main part of the means for the scientific researches is allocated from the governmental budget. The other sources of financing are not acting completely yet. For instance, the stage of the whole field development is that the enterprises, commercial organizations are not interested in financing the scientific researches for implementation of them in their work, as it is accustomed in many other countries.

Scientific education however confronts many challenges, among which are:

a) Absence of specific directions in scientific activity, for instance, on family medicine and primary healthcare, medical education specialties – spheres under the reforms in the field of healthcare and that are urgent not only for Uzbekistan but for the world community as well.
b) Insufficient quality of several supported works due to the absence of information on work methodology accepted in the world practice and deficiency of scientific, periodical literature in competitors.

c) Developing practical activity from scientific research introduction
d) Insufficient financing of scientific researches as well as material basis for their fulfillment
e) Insufficient social partnership and enterprise disinterest in healthcare research financing.

8.3.5 Instructional Literature Material Support

Providing the educational process with high-quality educational literature is one of the priorities of education reform program. In this field, educational institutions held certain activities. General literature stock of institutes is 58.9 thousands names, 2 million copies, among them 969 thousands copies of manuals and school-books, 133 thousands copies of fiction, foreign literature for 127 thousands copies, and scientific fund for 66 thousands copies.
In order to enrich the library stocks with related literature, medical institutes use budget and off-budget funds as well as manuals purchased from USA, Great Britain, Germany, Japan, Korea, Russia and other developed countries.

During 1995-2000 medical institutes purchased 1.4 thousands types of manuals, among them 118.5 thousand copies were published in the Republic of Uzbekistan, 639 types – 5.3 thousands copies published in CIS countries as well as the literature on 1287 types (7.5 thousands copies) published abroad. Among them there are also manuals received on humanitarian line for the amount of 2.4 million sums. In the year 2001 institute libraries were enriched with manuals, presented by "SOROS" and "PERCA" Foundations, Center for Development of Science and Culture of Asia. Institutes also purchased educational literature of such publishing houses, as "Practice", "Binome", Geotar", "Medicine" of Moscow. Annually the library stock of institutes replenishes by magazines in English received by grant from Japan, Brazil, USA, Turkey and other countries.

During 2001 – 2002 academic years institutes 12 monographs, 20 manuals, 26 school-books, 146 lection conspectuses. Institutes created special training halls for foreign literature. Medical institutes and colleges annually hold subscription for 20-25 kinds of scientific and popular scientific magazines.

The analysis of similar activities in surveyed medical colleges revealed, that library stocks

of all medical colleges are enriched at the expense of off-budget funds of colleges and oblast departments of Secondary Specialized Vocational Education.

General library stock of secondary medical colleges and professional schools is 2.7 million copies of books for the amount of 35.7 million sums. For the past 3 years medical colleges purchased 103 thousands copies of literature for the amount of 23.6 million sums as well as the literature of CIS countries for the amount 850 thousands sums.

Issues of composing and publishing of certain books necessary for medical colleges are handled by methodical department of the Ministry of Health. School-books were composed on 31 newly introduced subjects as well lections texts on 26 subjects. Besides, with the purpose of composing books of new generation Center for Secondary Specialized Vocational Education and book authors signed 22 author's agreements. According to data of the department for education of the Ministry of with the purpose of providing the didactic basis lecturers of medical colleges composed the following: 1361 educational and methodical complexes, 38518 distributive materials, 572 manuals for lecturers as well as 6068 manuals, 2214 lection conspectuses for students. Last year lecturers of medical colleges composed 4 textbooks for publishing. 232 training programs prepared for medical colleges were under the expert evaluation of the Commission under the Board of Directors and were handed over for publishing to the Center of Secondary Specialized Vocational Education.

However, on line of specialties the problems of qualitative educational and methodical literature accessible to all lecturers and students still exists.. Another important moment should be utilization of principles and methods of evidence-based medicine while carrying-out proper textbooks, monographs, manuals and other educational literature.

8.3.6 Activity of International Organizations and Collaboration

Since the early stages of independence Uzbekistan has collaborated with the different international funds and organizations, including the medical education area. At the present time World Bank, Asian Development Bank, USAID, UNICEF, WHO, OSI, SOROS fund, TACIS, CDC and some others have different projects and organize seminars and trainings for doctors and middle level personnel on different subjects. These activities are very important and useful, and have helped to improve the knowledge and practical skills in

many doctors and middle level personnel significantly.

However during the surveys, it became evident, that, unfortunately, these activities are not coordinated with the Human resources department of Ministry of Health as well as with human resources department at local levels. The work involves mainly chief specialists at local levels as organizers of training participants. Thus, the activity does not always involve all the interested people and organizations. Certain departments and divisions do not have a possibility to participate in such programs as equal partners with the purpose of mutually beneficial co-operation planning in the sphere of medical education with all the effluent consequences.

8.4 Over-all Assessment

This section shows an assessment of the over-all medical education from the perspective of strategic planning. Strengths and weaknesses have been identified in a workshop of the Working Group on Human resources last January 2003.

The following discussion summarizes the key points raised in this report and in the minutes of working group discussions.

8.4.1 Achievements of Medical Education in Uzbekistan

- The State Educational standards have been developed and approved.
- The educational programs (in Russian and Uzbek languages) have been developed:
- For bachelorship (all directions) around 7000 programs were composed on 350 subjects;
- For training the specialists on nursing activities with higher education more than 3000 programs were composed on 74 subjects;
- 71 programs composed for 32 directions of magistracy
- Magistracy level started training on evidence-based medicine basis.
- Establishment of closed contacts with foreign educational institutions participating in educational process reforms in institutes of higher education.
- Introduction of new knowledge evaluation systems, particularly OSCE.
- Several institutes transferred to rating system of faculty members evaluation and financial stimulation of their work quality.

- Establishment of new educational and methodical manuals and guidelines for lecturers and students.
- Wide implementation of modern educational technologies into training process.
- Enrichment of medical institutes' library stocks at the expense of grants.
- Gradual opening of informational and resource centers with access to Internet in medical high education institutes for lecturers and students.
- Samarkand medical institute has an interesting experience of self-government, where students on their initiative organized the Association of medical students.

8.4.2 Problems

- Admission to higher education and specialized educational institutes is without consideration and evaluation of labor market needs
- Complete re-orientation for graduation of GPs from medical higher educational institutes can lead to the deficiency of other specialists
- Healthcare structure remains highly specialized, that is why the issue of graduate employment is still acute.
- Lack of primary specialization of medical students on all the referrals for preparation to an independent practical activity and obtaining working license
- Insufficient time for independent work of students with patients and practical training at senior courses.
- The award of Diplomas as doctor-specialists for graduates of 7th course, according to special annual Decree of the Cabinet of Ministers. For reasons cited in the text, this is compromises the reputation of the whole health system as students are ill-prepared for independent practice.
- One of the key problems is the absence of detailed studied concept of medical education in accordance with changed requirements, and as a result there is a mismatch between graduates' qualifications with real requirements and levels of their competency for independent activity as specialists.
- Low quality of specialists training in regional higher specialized educational institutes
- There is a problem of contradiction between several legislative and sub-legislative documents to each other as well as the necessity of introduction of amendments in regard to changed conditions in the reform process.
- An important problem to be solved this year is the issue of functional illiteracy and

problems with educational literature for pupils studied Uzbek language using Latin characters. The problem occurred due to the fact, which textbooks on medicine in Uzbek language using Latin characters are not published yet and major part of lecturers are not in possession of using such characters.

- Weak material and technical basis of educational institutes and clinical bases as well as the absence of clinical base evaluation criteria and the possibility of choosing more efficient modes by educational institutions
- Insufficient knowledge and incompetence of teaching staff in the filed of modern principles of knowledge evaluation and regulations of design and conduction of such evaluations.
- Problems with informational and methodical supply of training process
- Labor market: absence of needs evaluation and medical staff distribution system, absence of real social partnership in medical education sphere
- Low level motivation of students, lecturers and healthcare workers
- Insufficient education quality, including knowledge and skills evaluation system
- Insufficient succession in continuous professional education system and specialists accreditation and licensing system
- Absence of scientific researches in the field of medical education
- Actual absence of Institute for evaluation and self-evaluation of institutes of higher and secondary specialized vocational education

CHAPTER 9
DRUG SUPPLY LOGISTICS

9. DRUG SUPPLY LOGISTICS

9.1 Legal Issues

9.1.1 Framework

During the period of Health Reform, Uzbekistan established a legal framework on pharmaceuticals. As an initial part of this framework, the Presidential Decree was issued as follows:

- "Establishing the State Joint-Stock Concern "Uzfarmsanoat", June 2, 1993.
- "Additional measures on filling the domestic market with medications and medical products", November 8, 1994, No 985.
- "Streamlining the sales of medications in the Republic", July 14, 1994, PF-016

Subsequently, laws of the Republic of Uzbekistan concerning pharmaceuticals were enacted as follows:

- "Certification of goods and services", 1993.
- "Protection of Consumers' rights", 1996.
- "Advertizing", 1998
- "Import and export of products", 1998
- "Adjustment of selling of medical drugs and products", 1999
- "People's health protection, 1996. (Excerpt with amendments and addenda, 1999)
- "Pharmaceuticals and pharmaceutical activities", 1997 (with amendments and addenda, 1999)
- "Narcotics and psychotropic substances", 1999.
- "Licensing some kinds of activities", 2000.

Among above laws, "Pharmaceuticals and Pharmaceutical Activities" is a comprehensive act particularly on pharmaceutical activities, including the following 16 aspects.

- Legislation of the Republic of Uzbekistan on pharmaceuticals and pharmaceutical activities
- The state's guarantee in the sphere of providing pharmaceuticals to the population
- The authority of state bodies in the sphere of providing pharmaceuticals
- Jurisdiction of the Ministry of Health of the Republic of Uzbekistan
- Registration of the pharmaceuticals and medical products

- Producing the pharmaceuticals
- Producing the pharmaceuticals in the pharmacy
- Labeling, packing, and designing the pharmaceuticals
- The clinical test of pharmacological medicines
- Rights of patient-volunteer, participating in clinical test
- Selling pharmaceuticals and medical products by industrial enterprises and wholesale trading companies
- Selling pharmaceuticals
- Trader of exporting and importing pharmaceuticals
- Duties of medical facilities to inform on the adverse reaction of pharmaceuticals
- Information on pharmaceuticals and medical products
- Penalty for violating the legislation

As can be seen, Presidential Decrees and subordinate laws were established, however, two major tasks have arisen to be undertaken.

First, it is necessary to revise the law in accordance with the present situation of pharmaceutical sector, since the pharmaceutical market has changed drastically in this decade.

Second, enforcement of the laws needs to be strengthened. There is no inspection system to oversee whether the law is kept or violated. For example, although there is a regulation that some drugs must not be sold without prescription, drugs can be purchased 100% without prescription in reality. Another example is that although drug advertisement must be done after getting the permission from MOH, nobody cares about the law and the advertisement is done without restriction.

9.1.2 National Drug Policy

In order to strengthen the legal framework, National Drug Policy of the Republic of Uzbekistan was established in May 1999, as a legislative core for managing the pharmaceutical activities in the country. It aims to provide the population with high-quality, effective and safe drugs, and their proper prescription and use. The main contents of this policy in Uzbekistan pledge to;

- Provide people with high-quality, effective and safe drugs
- Establish a unified national system of quality control and registration of prescription drugs

- Develop domestic pharmaceutical industry, and to create jobs in pharmaceutical sector
- Promote rational use of prescription drugs
- Advance professional training programs for pharmaceutical personnel

Nevertheless, this national drug policy is established only involving MOH level and has not yet been approved by the Cabinet of Ministers, and therefore it is not considered to have obtained any legal force. The government officials are planning to revise this national drug policy and to obtain approval from the Cabinet of Ministers.

9.1.3 Schemes

Bringing this national policy into shape, schemes of essential drug, drug formulary, pharmacopoeia, drug registration, and standard treatment guideline have been revised or are being revised. Brief review is given on each scheme below:

(1) Essential Drug List

The concept of "Essential Drug" is central to the National Drug Policy. World Health Organization (WHO) defined essential drugs as "indispensable and necessary for the health needs of the population. They should be available at all times, in the proper dosage forms, to all segments of society." Introduction and implementation of essential drug concept is crucial for better supply of drugs, as it helps doctors choose drugs for most effective, reasonable, and rational treatment for patients. Fundamentally, the essential drug list should be prepared for the wide population to treat common diseases, based on primary health care concept.

In Uzbekistan, the essential drug list was issued in May 2001 covering 351 kinds of drugs.

(2) Drug formulary/ Pharmacopoeia

The reference book for drug use titled 'SPRAVOCHNIK' was published. It covers the information on drug form, drug action, indications, dose, side-effects, contra-indications, warnings, and interactions. Also, Uzbekistan Pharmacopoeia, which for the time being refers to that of the USSR, is under preparation.

(3) Drug Registration

MOH publishes a booklet, titled 'State List (Register) of Pharmaceuticals and Sanitary Goods' every 5 years in order to register all drugs used in Uzbekistan. More than 3,500 kinds of pharmaceuticals are registered, categorized by imported drugs, drugs used in CIS, drugs produced domestically, diagnostic drugs, substance and sanitary goods. It also discloses the following information on each pharmaceutical and sanitary goods: brand name, form (tablet, bottle, etc.,), generic name, country produced, manufacturing company, categories (antibiotic, vitamin, etc.,), date of registration, and registration number.

(4) Standard treatment guideline (STG)

Seven kinds of STGs exist at the present time. These are; for Emergency case, Surgery, Cardiologic, Eye microsurgery, Urology, STD, Gastroentrology, and for SVP level.

As can be seen, much effort has been made to put the legal framework into shape. However, some problems can be found on the essential drug list and standard treatment guideline.
It is questionable as to the selection of drugs in the existing essential drug list in Uzbekistan for the following two reasons; it includes too great a number of drugs used at the tertiary level; it has a tendency of choosing relatively modern drugs rather than time-proven drugs with efficacy, safety, and reasonable price. These can be attributed to the simple fact; the concept of essential drugs is more or less misunderstood. The list in this country includes maximum number of drugs conceivable for any possible illness, without giving much consideration to disease pattern, drug efficacy, safety, and price. Consequently, this is causing confusion in drug use at primary level.
Therefore, it is urgently necessary to establish an essential drug list for SVP level (Primary health care level) in particular.

Likewise, problems in STG at SVP level can be seen; one drug is described not in generic name but in brand name; one drug that is not included in the national essential drug list appears. As well as revising the essential drug list, STG for SVP level should also be better developed further.

Moreover, it should be emphasized that in Uzbekistan there is no law regarding generic substitution. Both doctors and pharmacists usually use the most popular brand names when they describe drugs. Pharmacists (*Provizors*) can distinguish between generic and brand

names, but very few pharmacy assistants (*Pharmacists*) can, although they are the ones who sell drugs over the counter at pharmacies.

In summary, the government and MOH have been making possible efforts at forming legal framework, however; some undertakings need to be further accomplished. First, laws need to be revised in accordance with the present status of pharmaceutical market. Second, the system of enforcing the laws needs to be established. Last, National Drug Policy needs to be urgently approved to be a legal force, with giving careful consideration to essential drugs and generic substitutions in its scheme.

9.2 Drug Distribution

9.2.1 Drug Budget and Finance for drug procurement

The country's annual budget for drugs is shown in the table below. Speaking of ratio, the budget for the drugs in 2001 accounted for 12% of the whole budget.

Table 9.1 Drug Procurement Budget

Year	2000	2001	2002
Amount (million sum)	8,400	12,300	16,600
Amount* (thousand USD)	21,000	15,375	16,600

Remark ; Amount in USD was calculated by the government official in MOH using the following approximate currency exchange rate;

Year	2000	2001	2002
Currency exchange rate (Value of sum to 1 USD)	400	800	1,000

Apart from the national budget, MOH also received credit for drug procurement in 1999, 2000, and 2002 and the amount was five million USD each year. This credit was spent on procurement of drugs that were provided to patients free of charge.
Moreover, drug donations are made as humanitarian aid by several international organizations and basically sent to SVPs through central rayon hospitals. The amount of humanitarian aid on health accounts for 14.6% of the total health expenditure in 2002.
Among this, 2,293,300,000 sum (13.8% of the total budget) were allocaed to the republican hospitals to purchase drugs in 2002.

The table below shows the amount of expenditures on drugs in 2002 in the surveyed oblasts.

Drug expenditure per capita varies by oblast.

Table 9.2 Amount of drug procurement expenditures by oblast in 2002

Oblast	Population	Drug Expanditure (sum)	Drug Expenditure per capita (sum)
KKP	1,552,500	681,000,000	438.6
Ferghana	2,776,749	1,121,200,000	403.8
Navoi	1,105,527	270,000,000	244.2
Samarkand	2,797,315	1,048,500,000	374.8
Bukhala	1,472,346	636,200,000	432.1
Tashkent	2,401,400	805,000,000	335.2
Tshkent city	2,157,900	830,000,000	384.6

9.2.2 Human Resources on Pharmaceutical Sector

There are two levels of certified positions in pharmaceutical sector: '*Provizor*' and 'Pharmacist'; *Provizor* is with 4-year education, while *Pharmacist*, in this republic, with 3-year education. Tashkent Pharmaceutical Institute is the only institution for the education of Provizor. The Institute educates 1,100 pharmaceutical students every year and 80% of the graduates choose to work for the private sector. In addition, there are 10 colleges for the education of *Pharmacist*.

The institute also has a re-training programme. Provizors who work both in public and private sectors are required to participate in this re-training programme every 5 years after graduaction. If they do not participate in the re-training programme, no promotion in career is likely to be awarded in public sector; likewise, in private sector, they will be divested of pharmacy license. As such, this re-training programme for *Provizors* is well prepared, while no systematic re-training is in place for *Pharmacists*. The Institute admits that the knowledge of *Pharmacisits* on drugs is insufficient.

9.2.3 Dori Darmon

The following chart describes the drug distribution system in Uzbekistan.

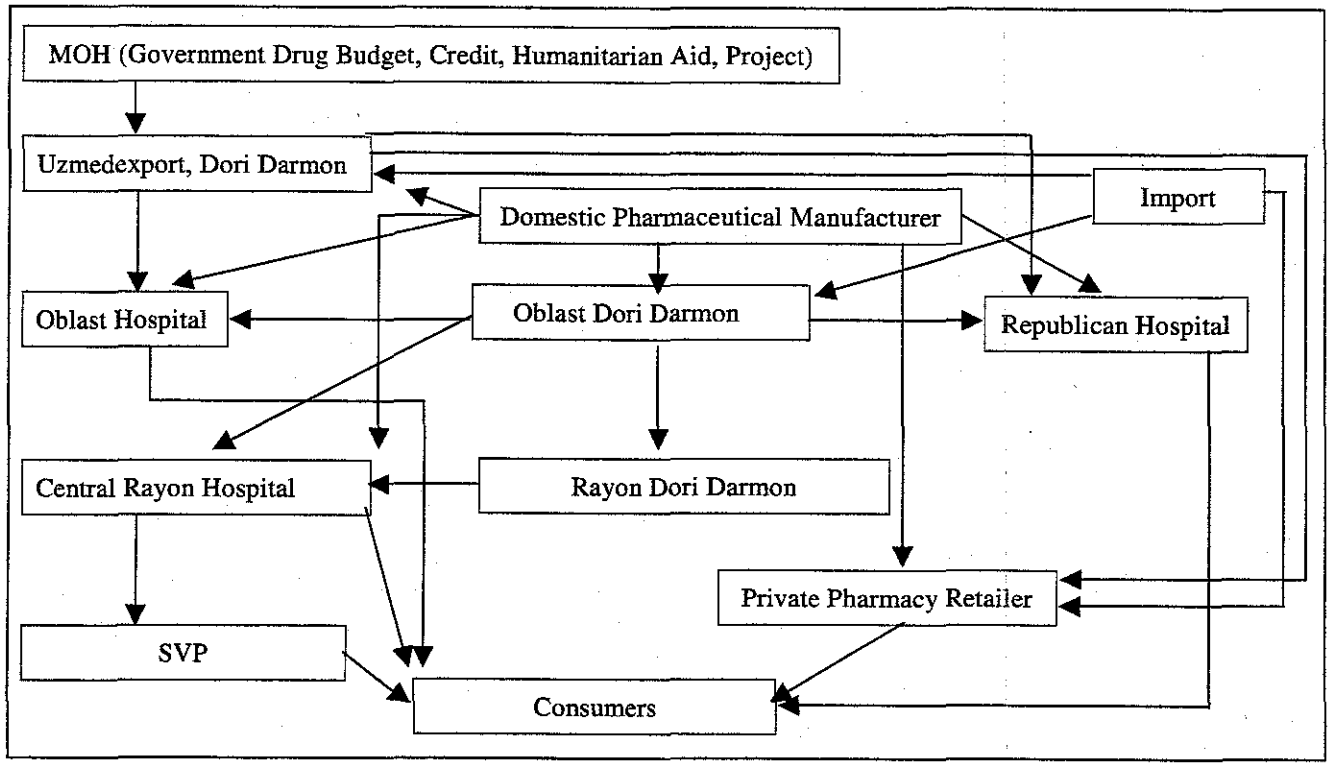


Figure 9.1 Drug distribution system

(1) Outline of Dori Darmon

Dori Darmon was state-owned during Soviet era, but now is a joint-stock company that plays an important role as a distributor of pharmaceuticals to health facilities and consumers. They have a warehouse within their central pharmacy in Tashkent, and branches in each oblast, where the quality of drugs both imported and domestically produced are tested at their laboratory.

Revenue and Expenditure of Dori Darmon are as follows;

Table 9.3 Revenue and Expenditure of Dori Darmon

Revenue (Unit: million sum)

	1995	1996	1997	1998	1999	2000	2001	2002 (until September)
Bank transfer	2,035.2	2,730.2	4,297.0	4,146.8	6,413.2	12,466.5	22,910.4	20,442.4
Cash	338.6	1,261.2	571.5	544.6	960.6	1,709.7	2,464.7	3,307.5
Total	2,373.8	3,991.4	4,868.5	4,691.4	7,373.8	14,176.2	25,375.1	23,749.9

Expenditure

	1997	1998	1999	2000	2001	2002 (until September)
Domestic (million sum)	812.0	945.0	1,403.7	1,577.0	2,117.7	1,683.3
Import (thousand USD)	4,500	7,940	7,940	7,940	7,940	6,255

There is also an oblast Dori-Darmon in each oblast. Its major responsibilities are; to supply drugs to the health facilities in the oblast, to test quality control of the drugs both supplied to health facilities and produced in the hospital pharmacy department, and to give drug information. For instance, Dori Darmon's laboratory in Ferghana oblast conducted quality control test in 2002; they tested 12,585 drugs, among which 146 drugs were found unqualified.

At the present time, Oblast Dori Darmon, as well as Tashkent office, is authorized to import drugs freely and independently. By importing large amount at a time, they are able to supply drug to health facilities at lower price than other private distributors.

(2) Share in drug budget procured from Dori Darmon

The questionnaire was made to investigate how much Dori Darmon is involved in drug procurement at secondary and tertiary level of health facilities. 38 health facilities in our surveyed areas responded; Republic of Karakalpakstan, Bukhara, Navoi, Samarkand, Tashkent, and Tashkent city.

The table below shows the average share in drug budget at two levels of health facilities, procured from Dori Darmon at the health facilities. As Dori Darmon mainly supply commonly-used drugs, the share is smaller at tertiary level where more variety in drugs is required

Table 9.4 Average share in drug budget, procured from Dori Darmon at two levels of health facilities

	Secondary level	Tertiary level
% of procurement of drugs from Dori Darmon	77.9	56.4

(3) Distribution proportion

The following table shows the drug names frequently appeared both on sufficiently and short-supplied from Dori Darmon in 2002. Disproportionate distribution in some drugs can be observed; for example, some facilities are supplied with penicillin sufficiently, while some short-supplied. From the point of view of patients, this is creating much inconvenience.

Table 9.5 Drug names frequently appeared both on sufficiently and short-supplied from Dori Darmon

Ten drugs frequently appeared sufficiently from Dori Darmon in 2002		Ten drugs frequently appeared short-supplied from Dori Darmon in 2002	
Drug name (*Italic*-brand name)	% of facilities indicated the drug name	Drug name (*Italic*-brand name)	% of facilities indicated the drug name
Glucose	12.8	*Arduan* (Pipecronic bromide)	7.6
Ethanol	8.3	*Ditillin* (Suxamiethonium bromide)	5.4
Penicillin	7.5	Prednisolone	5.4
Sodium Chloride	6.8	Penicillin	4.3
Analgin (Metamizol)	6.8	Oxytocin	4.3
Dimedrol (Difenhydramin)	5.3	Albumin	4.3
Novocain (Procain)	4.5	Ampicillin	3.3
Dibazol *	3.8	*Analgin* (Metamizol)	3.3
Aspirin	3.8	*Cinesterol* (Hexcetrol)	3.3
Morphine	3.8	*Pentamin* (Azametonic bromide)	3.3

Note: *this drug is not included in the national essential drug list

Disproportionate distribution of drugs apparently emerged from our research on supply side. This points out lack of communication and information sharing on drug inventory between health facilities and Dori Darmon.

9.2.4 Domestic Drug Manufacturing

Uzfarmsanoat is the biggest state joint stock concern on pharmaceuticals in Uzbekistan. It

was established in 1993, beginning with two scientific research institutes and two factories with sales of 45million sum. 20% of company revenue has to be paid to the government as tax, although they are given tax concession that they only need to pay 10% when company revenue needs to spend on investment in plant and equipment. Now, it has the licence to produce more than 260 medicines and their sales accounts to 20 billion sum, with over 70% market shere in the domestic pharmaceutical industry. Many pharmaceutical factories and research institutes have become affiliated with Uzfarmsanoat, 70 in total, including 20 Joint Ventures. 10-15% of their products are supplied to Dori-Darmon and the rest are supplied to private pharmacies. The ingredients are mostly imported from China and India, but locally cultivated plants are also used.

Domestic drug manufacturing is developing, yet most drug procurement is still predominated by import. As far as essential drugs market is concerned, their share is only 25%, and this figure is lower than WHO's reccomendation, which claim most essential drugs should be manufactured locally. The person holding a managerial position admitted that more investment of equipment is necessary to increase the amount of drug manifactuting.

In summary, drug distribution can be improved and strengthened in two ways. By encouraging closer communication and proper information sharing on inventory between Dori Darmon and health facilities, disproportionate distribution can be diminished. Further, Domestic pharmaceutical manufacturing should be more promoted, so that essential drugs are supplied at lower price, subsequently leading to more stabilized drug market.

9.3 Accessibility to Drugs

In Uzbekistan, there are two ways in accessing to drugs; at health facility and pharmacy. Out-patients go to a pharmacy to purchase drugs with prescription issued by doctor. In-patients are basically provided drugs from a health facility free of charge, however, if the drug is out of stock, they have to purchase it from the pharmacy outside.

To gauge the overall accessibility of drugs, the survey was conducted with the following forcuses: drug availability and inventory management at public health facilitiy, frequently used health facilities, accessibility to pharmacy by areas, drug price and quality of service at private pharmacy.

9.3.1 Public Sector

The questionnaire survey was conducted in 102 public health facilities during the survey period. The number of facilities at each level is primary 31, secondary 56, and tertiary 15.

(1) Number of drugs stocked

The table below shows how many kinds of drug are stocked in pharmacy department. The average numbers are 32.7, 225.0, and 413.5 at each level of primary, secondary, and tertiary, respectively.

Table 9.6 Average number of drugs stocked in pharmacy department by level of health facility

	Primary	Secondary	Tertiary
Internal use	9.0	74.0	88.0
Injection	15.7	89.0	272.0
Produced in the pharmacy	0.0	35.8	53.5
Total average	32.7	225.0	413.5

(2) Indicator drug availability

The questionnaire also asked the level of availability of fifteen indicator drugs for one year period of 2002; 1: Not available for less than 3 months, 2: Not available for more than 4 months.

Table 9.7 Indicator drug availability by health facility level

	Drug Name	Form	Primary	Secondary	Tertiary
1	Aminophylline 25mg/ml	Injection		(%)	
Category	1		41.9	61.3	87.5
	2		58.1	38.7	12.5
2	Salbutamol 0.1mg/dose	Injection		(%)	
Category	1		25.8	29.1	42.9
	2		74.2	71.0	57.2
3	Ampicillin 500mg	Injection		(%)	
Category	1		35.5	81.3	84.7
	2		64.5	18.7	15.4
4	Gentamicin 40mg/ml	Injection		(%)	
Cat	1		29.0	75.0	84.7

	2		71.0	24.9	15.4
5	Acetylsalicylic acid 500mg	Tablet		(%)	
Categoly	1		48.4	87.5	91.6
	2		51.6	12.5	8.3
6	Proplanolol 40mg	Tablet		(%)	
Categoly	1		32.3	33.4	37.5
	2		67.7	66.7	62.5
7	Glyceryl trinitrate 0.5mg	Tablet		(%)	
Categoly	1		58.1	70.0	75.0
	2		41.9	30.0	25.0
8	Verapamil 40mg	Tablet		(%)	
Categoly	1		41.9	37.9	50.0
	2		58.1	62.0	50.0
9	ORS (Rehydron®)	Packet		(%)	
Categoly	1		64.5	64.5	55.5
	2		35.5	35.6	44.4
10	Diazepam 5mg/ml	Injection		(%)	
Categoly	1		33.3	40.7	63.6
	2		66.7	59.4	36.4
11	Promethazine 25mg/ml	Injection		(%)	
Categoly	1		22.6	20.0	14.3
	2		77.4	80.0	85.7
12	Prednisolone 5mg	Tablet		(%)	
Categoly	1		45.2	59.4	75.0
	2		54.8	40.6	25.0
13	Insulin	Injection		(%)	
Categoly	1		22.6	65.6	60.0
	2		77.4	34.5	40.0
14	Oxytocin 1mg	Injection		(%)	
Categoly	1		22.6	68.7	55.5
	2		77.4	31.3	44.4
15	Glucose 5%	Injection		(%)	
Categoly	1		45.2	78.8	75.0
	2		54.8	21.2	25.0

The results shown in the table above reveal that the most health facilities at tertiary level have either no problem or face no serious shortage of drugs for significant period of time. In contrast, primary and secondary level health facilities frequently face shortage of drugs in spite of demands. Specifically, almost all rayon hospitals complained that the supply by Dori Darmon satisfied only 58.1% of their need.

Public hospitals at tertiary level are given precedence over the allocation of budget, especially for the emergency hospital/department. Therefore, even though the requested drug is not supplied by Dori Darmon, they can afford to purchase it from other private companies. But, this is impossible for the primary and secondary level health facilities due to their limited budget.

Another factor for the shortage of drugs at primary level can be added. The drug stock status of central rayon hospital (CRH) has an influence on that of SVP. Ideally, 40% of drugs that CRH obtains should be supplied to the SVPs. However, the result of survey conducted in the secondary level health facility (CRH) shows that only 28.9% (in average) of drugs are supplied to SVPs.

Last, according to the observation, the level of drug stock at SVPs completely differs from one another, depending on whether they are given assistance by international donors or not.

(3) Inventory management

It is observed that performance of inventory management was far from being sufficient. Only the receipts are kept as inventory document in the pharmacy departments in CRH and SVPs. Particularly, inventory management is rarely in place at SVPs without any foreign project aid and training.

Problems on people's accessibility to drugs in public health facility are disclosed through the survey results, observation, and interviews. SVP, which is the most important health facility to implement primary health care, are suffering from shortage of drugs, and insufficient inventory management is observed.

When the drug is not available at SVP in rural areas, patients have to go to pharmacies, which are sometimes far from SVP. What is more is that the patient may have to pay for certain drugs that have no quality assurance. As such, shortage of drugs at SVPs imposes more burdens on the patients, especially the poor in rural areas. On the other hand, the SVPs with enough drug stock regularly donated by the international organizations are in different situation. The staff in SVPs explained that the number of patients has increased compared to when no donation was made, because patients became aware that drugs for frequently diagnosed conditions were available at any time. Apparently, regular drug stock brings about the reliance for treatment from patients, and in turn, reliance from patients gives medical staff an incentive and motivation for better health service.

Accordingly, improving drug accessibility in rural area should be set forth as first priority.

The experiences of other countries in same situation can suggest the following solutions. By using "Makhalla", traditional base of community which already exists and is administratively and mentally solid, it may be one of the alternatives to establish revolving drug fund (drug community fund). And another is the 'kit system', which is to supply prepacked essential drugs, with the estimated necessary quantity, directly to SVP.

As for the problem on inventory management, unsystematic inventory management is observed to be leading to the shortage of drugs and waste of financial resources. It is necessary to review the stock movement, and to establish the systematic inventory management method at all levels of facilities. ABC analysis[1] should help to understand the stock movement and VEN system[2] should help to manage the inventory.

9.3.2 Private Sector

(1) Frequency of usage

Pharmacy is the most frequently used health services. There are approximately more than 4,000 pharmacies in Uzbekistan. The following figure shows the rate of usage by health facilities, and frequency of visits in 2002. As can be seen, pharmacy ranks the highest among other facilities in both figures.

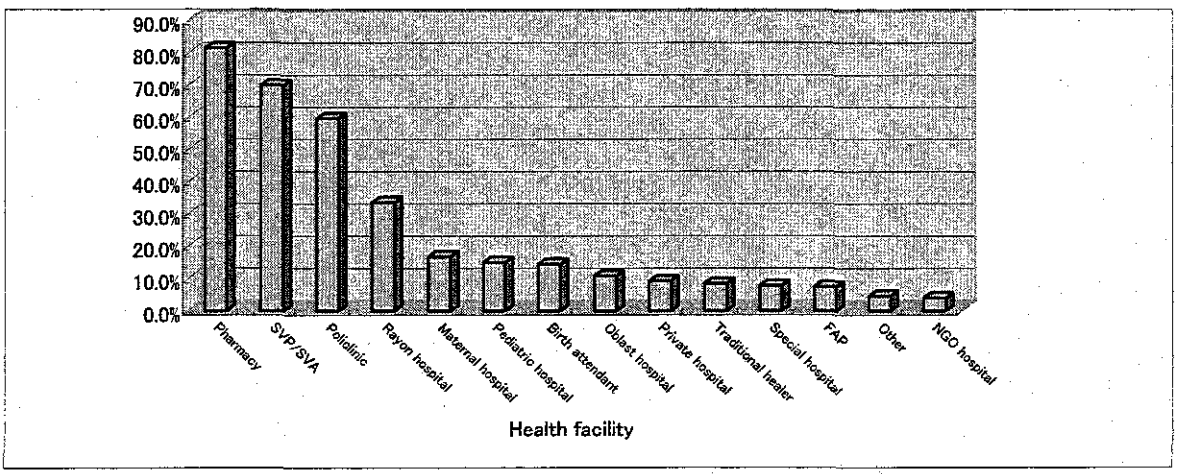


Figure 9.2 The rate of usage by health facilities in 2002

[1] ABC analysis: Method by which drugs are divided, according to their annual usage; Class A items are mostly high-volume, fast-moving drugs; Class B items are 15 to 20% of expenditures; Class C items are only less than 10% of expenditures. (Reference: Management Science for Health, *Managing Drug Supply*, second edition)

[2] VEN system: A system of setting priorities for purchasing drugs and keeping stock, in which drugs are divided according to their health impact into vital (V), essential (E), and nonessential (N) categories. (Reference: Management Science for Health, *Managing Drug Supply*, second edition)

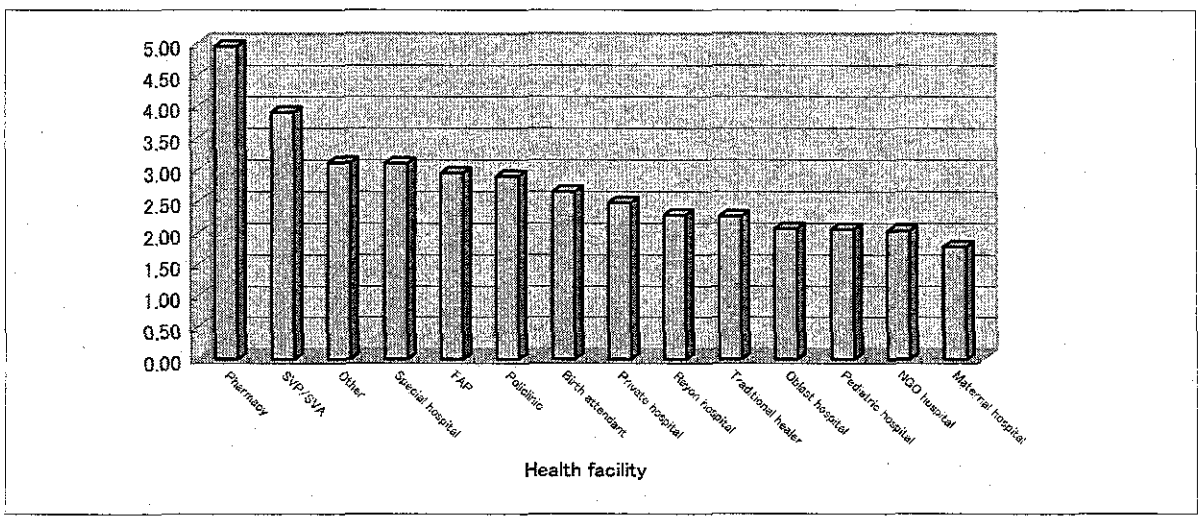


Figure 9.3 Frequency of visits by health facilities in 2002

(2) Accessibility to pharmacy by areas

As the tables below show, a disparity is seen in both the number of pharmacy and frequency of visit among oblasts, especially between Tashkent oblast and the Republic of Karakalpakstan.

Table 9.8 The number of pharmacy and by per million population in each oblast of survey area

Oblast	Population	Number of pharmacy	Number of pharmacy per 1,000,000 population
Karakalpak	1,552,500	159	102
Ferghana	2,776,749	374	135
Navoi	1,105,527	152	137
Samarkand	2,797,315	352	126
Tshkent city	2,157,900	1,000	463

Table 9.9 Frequency of visit to health facilities by Oblast in 2002

	Karakalpakstan	Bukhara	Navoi	Samarkand	Tashkent	Tashkent city
Average number of visit	3.59	4.90	6.02	5.06	5.85	5.24

In Tashkent, several choices of pharmacies are available in the neighborhood, while rural population need to travel long distance, for instance 100km, to the city in search of drugs.

The report on 'The Uzbekistan Village Pharmacy, Willingness-to-pay survey' reveals that in Karakalpakstan, 48% of the people have to travel to a rayon center or Nukus city to obtain antibiotics for the treatment of pneumonia. [3]

(3) Drug price

In order to investigate drug price, we visited 14 private pharmacies in Tashkent, Ferghana, and Karakalpakstan during the survey period. The outline of surveyed pharmacies are as follows: the average number of staff is 5.6 (range 1-20); the average number of Provizors is 2.6 (range 0-9); six pharmacies open 24hours; the average number of customer per day is 268 (range 12-800); the average number of customers with prescription per day is 46 (range 7-100); the average number of kinds of drugs stocked is 814 (range 75-2500).

The table below shows how many pharmacies had stocks of 12 designated drugs at the time of survey, their median prices, and price range of each drug. The prices vary by pharmacies. Median prices of 11 out of 12 drugs were higher than the international median price.

Table 9.10 Drug Price in Private Pharmacy

	Name	For m	Unit	International median Price (convert to sum in 2002 commercial rate)	Median price among the pharmacies surveyed (sum)	Price range minimum to maximum (sum)
1	Aspirin 250mg	Tab	1	2.3	8.2	6.0-10.0
2	Nitroglycerin 0.5g	Tab	1	10.0	8.7	7.1-10.0
3	Verapamil 40mg	Tab	1	11.8	45.0	33.0-86.0
4	ORS	Pkt	1	141.9	300.0	100.0-950.0
5	Ampicillin 500mg	Tab	1	35.0	41.25	35.0-90.0
6	Amoxycillin 500mg	Tab	1	35.2	90.3	48.0-150.0
7	Erythromicin 250mg	Tab	1	31.0	80.75	30.0-100.0
8	Salbutamol 0.1mg	Inh	200dose	1140.0	2400.0	1900.0-9090.0
9	Ampicillin 500mg	Inj	Vial	110.0	150.0	88.0-225.0
10	Gentamicin 40mg/ml	Inj	1ml	41.1	52.3	37.5-110.0
11	Prednisolon 5mg	Tab	1	7.5	29.5	20.0-120.0
12	Oxytocin 10iu	Inj	1ml	98.3	115.0	70.0-280.0

[3] Dennis N.W.Chao, 2003. *Report on the Uzbekistan Village Pharmacy Willingness-to-Pay Survey.* Counterpart International, Uzbekistan

(4) Quality of service

Pharmacy is the most frequently used health facility, however, the survey result below shows that more than 57.0% of the people are disappointed at the service of pharmacy.

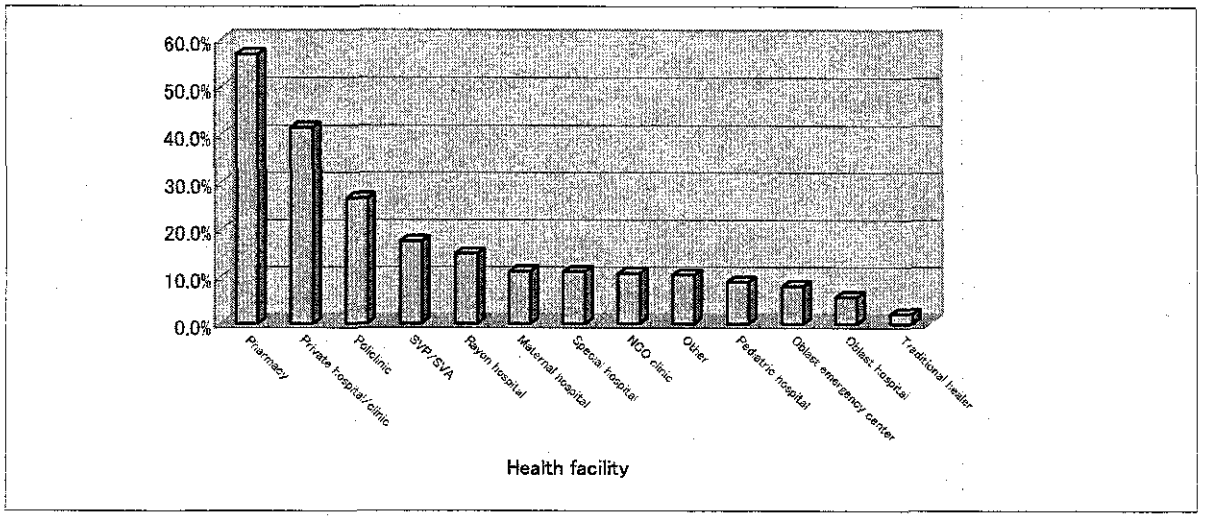


Figure 9.4 Health facility you have ever been disappointed at

The table below shows how many pharmacies actually had stockes of 12 indicator drugs at the time of survey. Although drugs such as verapamil and amoxycillin are frequently used in this country, they were not available in some pharmacies.

Table 9.11 Drug availability at private pharmacy

	Name	Form	Unit	Number of pharmacy stocked
1	Aspirin 250mg	Tab	1	14
2	Nitroglycerin 0.5g	Tab	1	11
3	Verapamil 40mg	Tab	1	8
4	ORS	Pkt	1	8
5	Ampicillin 500mg	Tab	1	10
6	Amoxycillin 500mg	Tab	1	6
7	Erythromicin 250mg	Tab	1	8
8	Salbutamol 0.1mg	Inh	200dose	14
9	Ampicillin 500mg	Inj	Vial	14
10	Gentamicin 40mg/ml	Inj	1ml	14
11	Prednisolon 5mg	Tab	1	8
12	Oxytocin 10iu	Inj	1ml	10

The foregoing survey results on pharmacy exhibit a clear picture of problems affecting specific group of people and quality of service. People in Karakalpakstan, as the data shows, have the least number of pharmacies per population, the lowest frequency of visit to pharmacy. This implies that they have fewer chances for comparing drug prices between different pharmacies. Thus, with the prices of drugs in this country being generally higher than the international median prices, the poor in the rural areas of Karakalpakstan are most

burdened.

Further, some private pharmacies show low availability in drug stock. Their drug stock status is not subject to any pharmaceutical lawful regulation as they are in private sector, nevertheless, as pharmacy being the most frequently used health facility and a lifeline for some people to certain extent, their inventory needs to be further improved.

Overall, in public sector, drug shortage is observed in health facilities at primary and secondary level. In private sector, accessibility to pharmacy considerably varies between Tashkent and Karakalpakstan. People in Karakalpakstan have the least accessibility to drugs both in public and private sector, and they may be also burdened with transportation cost to the pharmacy and relatively higher price of drugs comparing to international median prices. Considering this situation, the first priority needs to be set forth, to improve accessibility to drugs specifically in this area, and community participation should be emphasized for viable and self sustainable programme implementation, regadless of the nature of implementation agency. In fact, one of the NOGs 'Counterpart International' has already taken an initial step forward. They are preparing to establish village pharmacies in Karakalpakstan.

At the same time, inventory management both at public health facility and private pharmacy should be targeted for technical and systematic improvement. Sound inventory management contributes to higher drug availability.

9.4 Drug Utilization

In order to investigate drug utilization in prescription, the questionnaire was given to doctors and the interview was made to the women with children.

The survey asked the most frequently used drugs by doctors for diarrhoea, pneumonia, and common cold in generic names, but note that 47.3% (total number of answer was 429) of answers were made in brand name. Furthermore, the result shows doctors rely heavily on antibiotics in the cases of diarrhoea and common cold: 28.9% (total number of the answer was 128) of prescribed drugs for diarrhoea is antibiotics, 42.4% (total: 142) for common cold.

The Pharmaceutical Study in Ferghana Oblast' [4] also shows that 56% of the study population had three or more drugs prescribed for one diagnosis at one visit. 57% of the

[4] Talgat Nurgozhin et al. Technical Report "The Pharmaceutical Study in Ferghana Oblast, Uzbekistan" June 2001 Ferghana Oblast, Uzbekistan, Ensuring Access to Quality Health Care in Central Asia, ZdravPlus

population was prescribed at least one injectable drug. Antibiotics were prescribed for 56.5 % of all patients.
The interview with 15 women in Makhalla also supports the above results. They responded that the average number of drugs per prescription is five, twelve women answered that they prefer injections to orally administrated pills, only four of them care about side-effects of injection. One woman answered that she would be disappointed if the doctor does not prescribe injections.

In fact, the irrational use of drugs can be attributed to the following: patients' preferences in drugs, outdated drug knowledge or doctors' and pharmacists' still adhering to old habit of drug use.

As for the preference of drugs by people, apart from the above survey results, the government officials also pointed out that the use of injection, especially its easy use even when the patient has a slight illness, is the problem on drug use in this country. People's preferences and request on drugs encourage doctors prescribe irrationally, too.
It is also presumed that the drugs in the scene of self-medication are also subject to people's preferences even though they may be inadequate.
Although it is very difficult to change people's habit and attitude, continuous effort should be made at providing public education on drug use by using both mass-media at national level and locally in Makhalla.

Next, doctors and pharmacists are with outdated drug knowledge and information. Some frequently –used drugs, mostly injections are not considered as so effective nowadays but are still prescribed. Unnecessary and inappropriate drug use not only causes adverse drug reaction, but also increases cost of treatment. As an initial step, examination on the present way of treatment with drugs needs to be done to review whether there is wasteful treatment, overuse of injections and antibiotics, and excessive use of expensive brand-name drugs. The review, of course, needs to be done based on STG, which this study points out to be urgently revised.

Third, it is worth noting that recently in urban areas, aggressive marketing campaigns by pharmaceutical companies have made doctors tend to prescribe drugs in brand names. As a result, patients are forced to buy the drugs recommended by the doctors, which are often not only less affordable but also more difficult to reach than generics. At present,

pharmaceutical companies are the only source available to obtain drug information for doctors and it is often biased. Therefore, it is necessary to establish drug information center at government level to distribute correct and unbiased drug information.

In summary, our questionnaire survey to doctors and the report on 'The Pharmaceutical Study in Ferghana Oblast' indicate that polypharmacy is the issue; neither the doctors nor the pharmacists recognize generic names very much, prescription rate of antibiotics and injection is unnecessarily high. And irrational drug use is caused by several factors; Patients' preferences in drugs, outdated drug knowledge or doctors' and pharmacists' still adhering to old habit of drug use, and aggressive marketing campaigns by pharmaceutical companies. In order to cope with this situation, public education using mass-media or Makhalla, review of prescription habit, and establishment of drug information center shall be the necessary measures.

9.5 Conclusion and Recommendations

9.5.1 Conclusion

The government and MOH have been making possible efforts at forming legal framework, however; some undertakings need to be further accomplished. First, laws need to be revised in accordance with the present status of pharmaceutical market. Second, the system of enforcing the laws needs to be established. Last, National Drug Policy needs to be urgently approved to be a legal force, with giving careful consideration to essential drugs and generic substitutions in its scheme.

Drug distribution can be improved and strengthened in two ways. Disproportionate distribution can be diminished by encouraging closer communication and proper information sharing on inventory between Dori Darmon and health facilities. Further, Domestic pharmaceutical manufacturing should be more promoted, so that essential drugs are supplied at lower price, subsequently leading to more stabilized drug market.

As for accessibility to drugs, the first priority needs to be set forth, to improve accessibility to drugs for the poor in rural areas, specifically in this study in Karakalpakstan. And importantly community participation should be emphasized for viable and self sustainable programme implementation.

At the same time, inventory management both at public health facility and private pharmacy should be targeted for technical and systematic improvement. Sound inventory

management contributes to higher drug availability.

Last, public education using mass-media or Makhalla, review of prescription habit, and establishment of drug information center shall be the necessary measures need to alleviate irrational use of drugs.

9.5.2 Recommendations

- Law should be revised in accordance with the present situation of pharmaceutical sector
- Enforcement of the laws needs to be strengthened
- National drug policy should be revised and obtain approval from the Cabinet of Ministers
- Essential drug list for SVP level (Primary health care level) should be urgently established
- STG at SVP level should be improved
- Law on generic substitutions should be established
- Re-training programme for Pharmacist should be established
- Closer communication and better information sharing on inventory between Dori Darmon and health facilities are encouraged
- Domestic pharmaceutical manufacturing should be more promoted
- Drug accessibility in rural area should be improved by revolving drug fund or kit system
- Stock movement should be reviewed by ABC analysis
- Systematic inventory management method, using VEN system, should be established
- Public education on drug use by mass-media or Makhalla need to be implemented
- Prescription habit should be reviewed
- Drug information center should be established

CHAPTER 10
HEALTH INFORMATION SYSTEM

10. HEALTH INFORMATION SYSTEM

10.1 Health Management Information System (HMIS) : A Brief Overview

Uzbekistan has embarked on health reform with the objective of improving the efficiency and quality of the public health services. Health systems management more so at the time of the health reforms requires the regular monitoring of the following: health status of the population; provision of services in terms of coverage and utility; drugs stocks and consumption patterns; equipment status and availability; finances; and personnel at different levels. Such monitoring requires access to timely and accurate information from various sources delivering and supporting health and other services. Accurate, relevant and up-to-date information is essential to health service managers if they have to identify weaknesses in health service provision and take corrective action to improve service delivery. Accordingly, the development of effective information systems is a necessary precursor to managerial improvement.

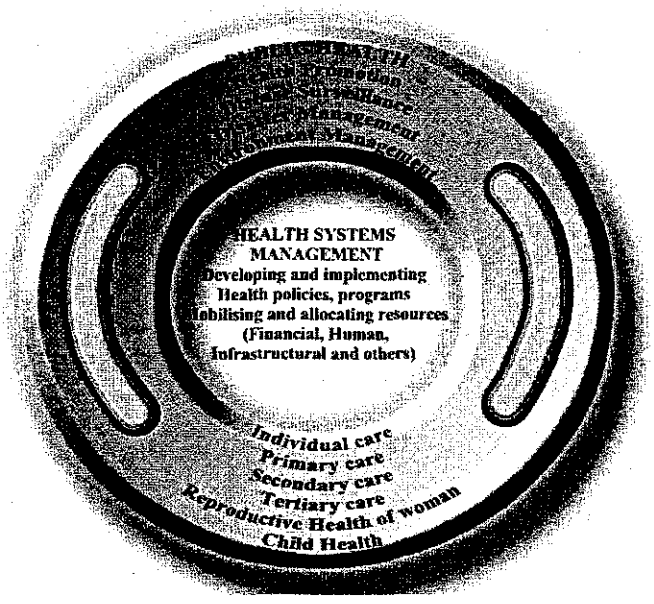


Fig. 10.1 Interdependence of Curative and Preventive Health

A Health Information System (HIS) is a process whereby health data (input) are recorded, stored, retrieved and processed for decision-making (output). Decision-making broadly includes managerial aspects such as the planning, organizing and control of health care facilities at the republican, oblast, rayon, and institution levels. It also includes clinical aspects which can be subdivided into (I) providing optimal patient care, (ii) training of medical personnel to generate appropriate human resources, and (iii) facilitating research and development activities in various fields of medicine.

Table 10.1 Various Subsystem of a Health Management Information System

Epidemiological surveillance	Identification/notification of diseases and risk factors, investigation, follow-up, control measures
Routine service reporting	Hospital/health center-based indicators on performance of the various services and programs
Specific program reporting	Various programs in operation in a particular country, topically include: Maternal health, AIDS, TB control, oncology, etc.
Administrative systems	Accounting and financial systems Drugs management (procurement, storage and delivery) *Personnel management* Asset management (procurement and maintenance of equipment, buildings, etc)
Vital registration	Birth, deaths, migration, etc.
Administrative systems	Accounting and financial systems Drugs

10.2 Organizational Arrangements for the HIMS in Uzbekistan

The organizational arrangement of HMIS, the agencies responsible for it at the four levels, namely Republican, oblast, rayon and facility, and the personnel involved have been listed in Table 10.2. The following pages give a description and evaluation of HIS at each level.

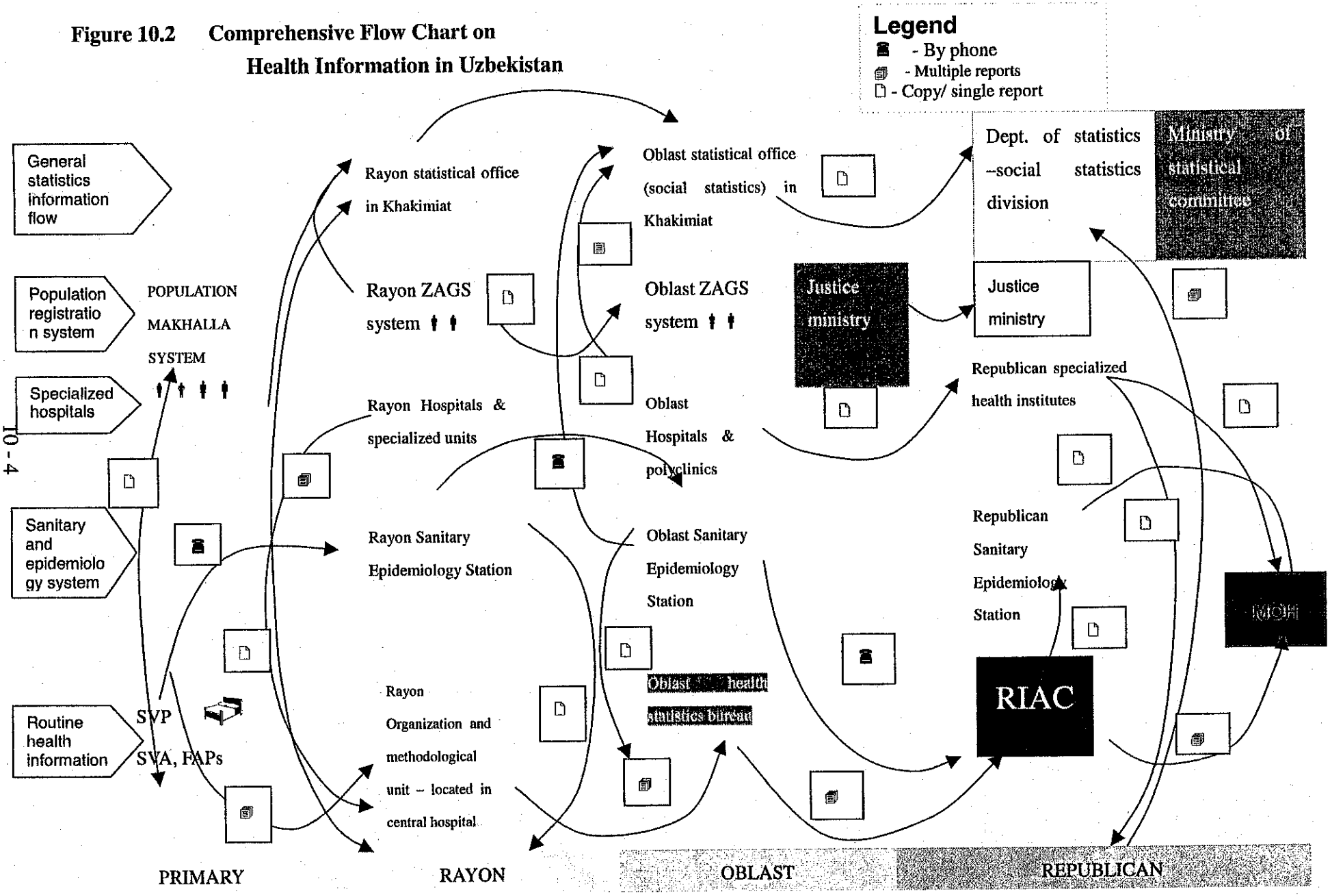
Table 10.2 Organization/Person Responsible at Different Levels – the Sections and Pages Matrix

Location/ Hospital	Agency/Person responsible	Brief	Detailed	Issues
REPUBLICAN LEVEL	1. Republican Center for Sanitary and Epid. Control	13, 15	13, 15	14
	2. Republican Specialized Research Institutes	2	2	24, 25
	3. Republican Information and Analysis Center (RIAC)	5	A-1	6
	4. Medical Statistical Unit/ Population Department of the Ministry of Statistical Committee (earlier part of the Ministry of Macro Economics & Statistics)			24, 25
OBLAST LEVEL	1. Statistics Section of Oblast Center for Sanitary and Epidemics Control	13, 15	13, 15	14
	2. Medical Statistics Bureau of Oblast Health Department	7, 8	A – 2	9, 24, 25
	3. General Statistical Department of Oblast			
	4. Statistical Sections of Oblast Specialized Health Care Institutions & Dispensaries	7, 8	2	9
		7, 8	2	9
RAYON LEVEL	1. Rayon Center for Sanitary and Epidemics Control –Statistical Section	13-15	13,15	14, 24, 25
	2. Central Rayon Hospital/Organization and Methodology Unit (ROMU)	9	A - 3	9
	3. Statistician of Rayon or Inter-Rayon Specialized Health Care Institutions/Dispensaries	9	2	9
	4. Rayon General Statistical Department in the Hakimiat	9	2	24, 25
	5. Rayon ZAGS	18	16, 17	18
SVP/SVA LEVEL	1. Chief nurse (she collects the reports from the all other doctors, laboratories, and units and develops the summaries)	10, 11	10, 11	12

At the Rayon level, there are specific personnel available for collating statistics in the children's polyclinic (statistician), TB dispensary (statistician) and rayon hospital (statistician). In all other cases, the responsibility falls on the chief nurse.

The comprehensive flow chart (Fig 10.2) will give a clear understanding of the organizations, and the flow and linkages among them starting from the primary facilities, and moving through the rayon, oblast and to the republican levels.

Figure 10.2 Comprehensive Flow Chart on Health Information in Uzbekistan



10.3 Republican Information Analytical Center (RIAC) :Description And Evaluation

The Republican Information Analytical Center (RIAC) was established in the year 1999 by the order of Ministry of Health (MOH) of the Republic of Uzbekistan # 694 by merging the three individual centers in the MOH, i.e. the computer center, the information center, the statistical center.

RIAC is the main agency responsible for health data standardization, collection, analysis, and reporting. It works in close coordination with the Statistics Committee Ministry's branch on health statistics. It brings out annual and quarterly health-related publications. RIAC staff includes doctors, statisticians, programmers and data processing operators. RIAC has around 30 computers, with total staff strength of around 100. The center has a full-fledged Computer Support and Software Development Department.

RIAC is headed by a director and assisted by a deputy director. It is internally organized into 8 departments on functional lines. The main departments include those of establishments, epidemiological survey, human resource system), and some supporting departments like computer programming, data entry and administration. Each of them has a head of the department and other staff members. (A detailed description has been provided in Appendix 10.1).

RIAC is primarily involved in collecting the various monthly, quarterly, and yearly statistical forms and consolidating and transmitting the collated data to the MOH, the National Statistical Committee, and other agencies.

RIAC employs computers for the work of consolidation, with the data entry being done at the central computer center. The Center also employs some small computer applications for departmental work (the details are provided in Appendix 10.1).

A SWOT analysis of RIAC has been presented in.

Table 10.3 A Swot Analysis of RIAC

Strengths	Weaknesses
1. Has been a part of health statistical system for many years. 2. Experienced staff who know the system, reporting formats and subject matter. 3. A positive reputation and long working experience with UN agencies and donors.	1. Cannot take independent decisions on the type of data to be collected, processed, etc. Legal dependence on the Ministry of Statistical Committee on the type, content of reporting. 2. No computerized databases developed – manual system. 3. Limited computer programming support. 4. Redundancies in reporting and other activities.
Opportunities	**Threats**
1. Computerization drive taking place in Uzbekistan in terms of increased awareness, interest and support from government, staff, and donors. 2. Several donor-supported projects in the offing. 3. Internet and networking support being made available in Rayons.	1. Computerization of SES, ZAGS may reduce the role and importance of RIAC. 2. Maintenance of large staff in the wake of reduced budgetary supports. 3. Several donor-supported projects developing/developed their own HIS.

Table 10.4 Health Information System at the Oblast Level: Organizations, Information Flow, Issues

	Ministry of Health			Ministry of Statistics committee	Ministry of Justice
Level	Oblast bureau of medical statistics	Sanitary and epidemiological station	Specialized hospitals	State General Statistics Department – social sector	ZAGS System (population registration)
Information flow	Information exchange within the departments			Information exchange with others	Information exchange with others
Staff	Large number of staff and specialized desks for each form	Compact staff headed by a doctor statistician, with around 2 to 4 support staff	No particular departments; usually one or two statisticians in each hospital	Compact staff for all social sectors and one person for health statistics	Specialized job, where reporting is only part of the work
Computers	No computers except in World Bank project experimental areas	Computerized with specialized software, spreadsheets, etc.	Computers are available but usually put to administrative uses	Computers available but not for medical statistics	Few computers available
Value addition	Aggregation analysis and transmission to RIAC	Aggregation analysis and transmission to RIAC	Aggregation and transmission	Planning for bed capacity based on utilization	Main job is registration
Issues	Lack of computer support in most oblasts – now rolling out the MEDSTAT	Very old software and non-standard applications at different oblasts		Very little analysis, with only one person for health statistics	

10.4 Oblast Bureau of Medical Statistics

The Oblast Bureau of Medical Statistics, which is located in the oblast health department, is the organization responsible for health information. (See Appendix 10.2 for more details.)

The **Oblast Sanitary Station Statistical Section** employs computer software for analysis and generation of presentation of information. (More details have been provided in the chapter on the infectious diseases reporting system).

The **Oblast General Statistics Department Social Sector** usually has a efficient statistical staff. In a month, they handle around 70 reports from the different social sector departments. They collect statistics from the private hospitals too, through a form (form no. 1) which is very similar to the one used for the public hospitals. Again, private health facilities, which have a staff of less than 10, submit their reports directly to the small business section of the trade department. They have a household survey section, which, every month, exhaustively surveys a few sample households, collecting detailed data on expenditure, income and other aspects. This information is then tabulated with the help of computers.

The **Oblast Demography Unit** is a part of the Statistical Department and functions from the oblast Hakimiat office with a compact staff. They receive information from the ZAGS and passport systems, and generate the demographic profile by age and other criteria.

The **Oblast ZAGS System:** is part of the Justice Ministry and usually collects the information from the rayon ZAGS, and also compiles the oblast-level statistics (The chapter on birth and death registration system has more details).

1) Issues

   a) Some sample oblasts like Sirdoria, which were part of the study, have brought out an annual report with graphs and others only 1999 and after that they have been unable to bring out reports due to the lack of funds.

   b) Some of the oblasts rely more on the abacus for calculations and tabulations of the rayon data. Oblasts like Samarkhand are equipped with a computer, but have put it to restricted use. Recently, they have loaded the MEDSTAT software, which will

help data entry of all forms and data compilation.

c) A large section of the staff has been working with the same reporting formats for quite a long time – in fact some of them have around 30 years' experience.

d) Except for the directors, who usually attend some meetings and training programs, the rest of the staff have not received any training on HIS or other subjects.

e) Graphs, display charts or other visual aids are generally not employed in several oblasts statistics bureaus, but some SES like Sirdoria employ graphical tools.

f) A map of the health facilities (hand drawn or computer generated) is unavailable in most of the oblasts, though some wall-painted ones are available in SES.

g) Most of the staff are keen on learning computers and shifting to computer- based aggregation and analysis.

Table 10.5 HIS at the Rayon Level:

Organizations, Information Flow & Issues

	Rayon organization and methods unit	Sanitary and Epidemiological Station – reports section	Central rayon, TB, infectious diseases hospitals	State General Statistics Department – social sector	ZAGS System (population registration)
Level	Information exchange within the departments			Information exchange with others	Information exchange with others
Information flow	One head doctor and two assistants (nurses)	One head doctor and one or two assistants	One statistician each	Compact staff for all social sectors	On head and two or three inspectors
Staff	No computers (World Bank project rayons are having computers)	1 or 2 computers, but no software – used only for typing	Computers are available with central rayon hospitals, but usually put to administrative uses like payroll, book keeping, etc	Computers are available but not used to compile medical statistics	No computers are available
Computers	Aggregation analysis and transmission to oblast Health Statistics Bureau	Aggregation analysis and transmission to oblast SES	Aggregation and transmission to ROMU, oblast-level specialized facilities	Planning for bed capacity based on utilization	Main job is registration
Value addition	Lack of printed forms training and support for field auditing	Routine way of manual reporting. Lack of data entry and analysis software for infectious diseases			Manual system with limited staff; has less interaction with health statistics unit
Issues					

(A detailed description of the Rayon-level HMIS agencies is presented in Appendix 10.3)

10.5 HIS at the Primary Health Facilities Level: Organization, Information Flow and Issues

There are three sizes of SVPs and the information system is mostly similar in all of them. The SVP is headed by a chief doctor and supported by general practitioners, pediatricians, a gynecologist and other nursing staff based on the population size.
At the level of the SVP, the chief nurse is in charge of health information. She collects the records managed by the individual doctors, laboratory and other staff, compiles them into routine reports and then passes them on to the rayon Organization and Methods Unit at monthly, quarterly and yearly intervals.

As per the MOH rules, each doctor has to see 5 patients an hour at the facility and 2 patients an hour in case of home visits, which are usually undertaken in the afternoon.

Only a few reports have to be submitted every month, but, every quarter and annually, a host of reports have to be submitted (the details are provided in Appendix 10.4).

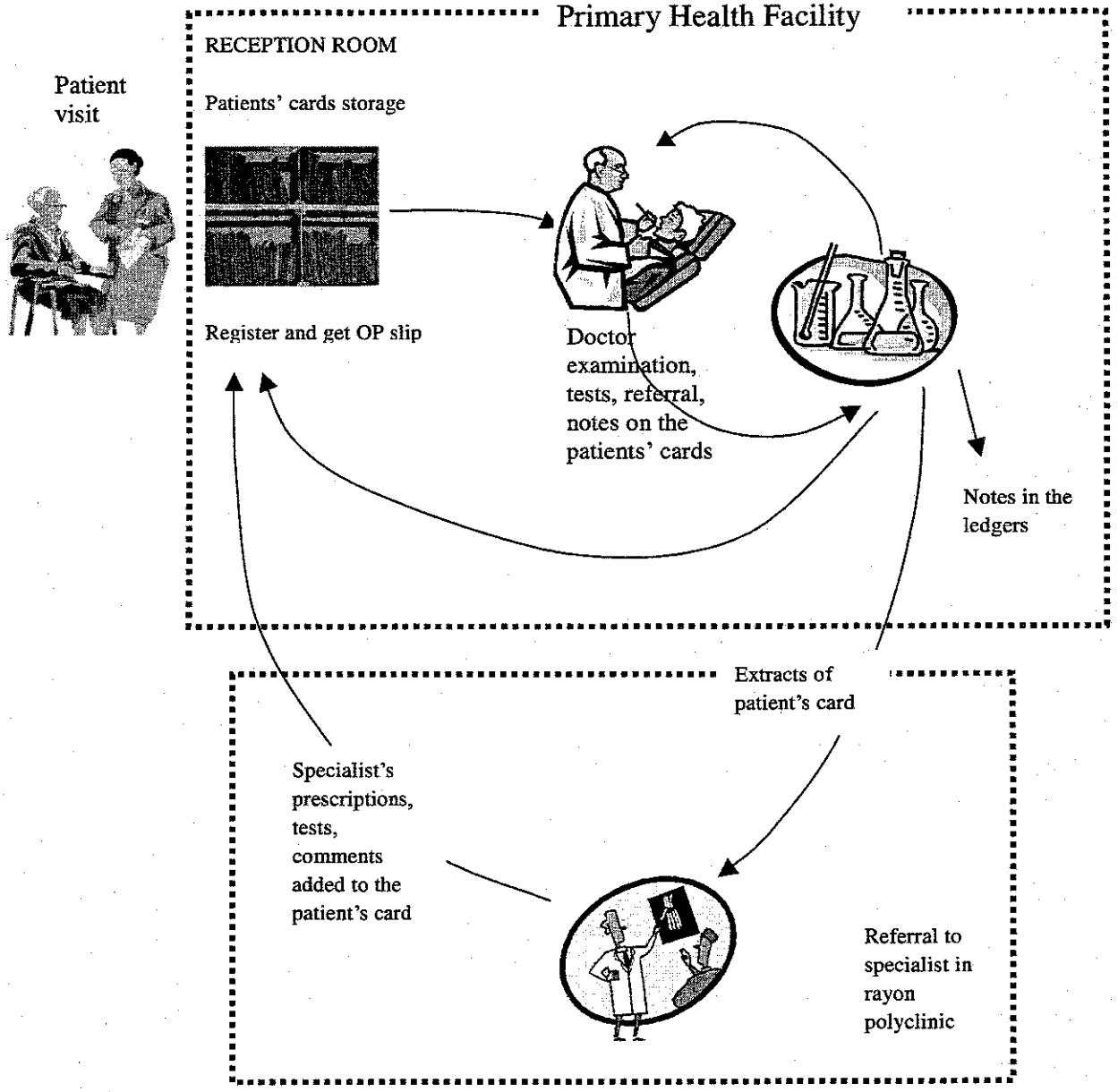
Order No 283 approves 374 forms of primary records, including 151 forms related to primary health care. Order No 677 approves 40 forms for state statistical reporting, including 16 related to primary health care – an extraordinarily large number definitely!

Household census: This census is conducted biannually by the SVP of the catchment area. The nurses cover their area usually in the afternoons and generate the updated population register.

There are three types of documents used to collate information at a primary health, care facility; the categorization is based on the nature of information and how it is generated.

1) **Primary record forms:** Individual medical cards of patients, registration cards, registration forms, registration logbooks.
2) **Secondary record forms:** Resuming or report forms for internal use at health facilities, and resuming registration forms for controlling, monitoring, documents coming from health facilities.
3) **Report forms:** Resuming or report forms to monitor the performance of health

facilities to be controlled by health care supervising bodies, forms of state statistical reporting



1. The patient's card is a small bound book, which is usually prepared from available stationery.
2. The SVP maintains a card for every person in the catchment area. Usually the cards are stored in the reception area, except if the patient is a child, an ANC mother and others, in which case the cards are stored in the respective specialist rooms.
3. Staff keep adding information related to every visit , vaccination (usually there is a printed form for any vaccination) test, report, and also include notes on x-rays and specialists' notes.
4. Patients' cards are extracted and sent to the specialists in case of referral, but sometimes the specialists can ask for the entire information related to a patient.

Figure 10.3 The Patient's Card and Clinical Information System at the Primary Health Facility

Notes and issues with regard to the HIS at the Primary Facility Level

1) The HIS is a very detailed and exhaustive system with several ledgers, registers and reports.

2) Since, this is a long-established system, the staff are familiar with record maintenance.

3) The documentation takes place alongside the patient treatment and health facility management.

4) Generally, the staff, except at the time of report submission, do not perceive it as very tedious and time-consuming.

5) Usually, nowadays, the printed forms and stationery are not available and the staff have to develop their own ruled forms using the general stationery.

6) The chief doctors are quite familiar with the reports and ledgers and acquainted with the various government orders on record maintenance.

7) The household information is maintained through the census conducted twice a year. Mukhalla also maintain a similar household census. However, very little verification and reconciliation of the systems is done , except for the total numbers.

8) The Zdrav Plus project, aimed at developing a computerized clinical information system, generates comprehensive information through a patient visit form, and appends the information to a database, thus facilitating the generation of various reports and ledgers for manual filing (a detailed description of this experiment has been provided in Annex 10.4).