

CHANGES IN THE HEALTH CARE SYSTEM...

## BASIC BENEFITS PACKAGE COSTING ASSESSMENT

Health Providers Manual

April 2008



REPUBLIC OF MACEDONIA  
MINISTRY OF HEALTH  
PROJECT COORDINATION UNIT

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*REPUBLIC OF MACEDONIA*

**MINISTRY OF HEALTH**

PROJECT COORDINATION UNIT

# Basic Benefits Package Costing Assessment

**Health Providers Manual**

April 2008

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# 1. Introduction

This Manual has been prepared by the Center for Research and Policy Development – CRPD Skopje and Oxford Policy Management – OPM within the consultancy committed by the Ministry of Health of Republic of Macedonia, under the Health Sector Management Project financed by the World Bank Loan. Authors of this Manual are Marija Risteska MSc and Aleks Manu.

The Manual has been prepared for all healthcare facilities in Republic of Macedonia and can be used in collecting and analysis of data for the costing of the healthcare services provided to the population of R. Macedonia.

The Manual contains guidelines on gathering data which are to be entered into the Econometric Model for defining the costing of the healthcare services and ultimately to analyze the recorded data so as to identify potential modifications in the financing model if various scenarios are to be implemented.

The Model for costing of healthcare services can be utilized on a macro level (by the healthcare policy makers and the entities within the system responsible for the funding of healthcare facilities) and a micro level (by the healthcare facilities for monitoring of expenses for provision of healthcare services to the population of R. Macedonia). Thus, it represents a practical tool for efficient management of the healthcare sector.

## 2 . Healthcare Costing Assessment Team

At the very beginning, we recommend the assessment of the costing of healthcare services to be initiated and directed by the policy maker (Ministry of Health) and the institution responsible for the financing of healthcare services (Health Insurance Fund).

Initially, an Assessment Team should be formed. The team of the initiator should not exceed 6 (six) persons as follows: 1 (one) Leading Assessment Coordinator; 4 (four) Regional Coordinators covering the healthcare facilities in the northern, eastern, western and southern part of the country; and finally 1 (one) Accountant specialized in accountancy in the healthcare sector.

The tasks of each initiator team member should be as follows:

**Leading Coordinator** – shall have the responsibility to develop the Assessment Methodology; in cooperation with the responsible persons within the Ministry of Health/ and/or Health Insurance Fund to adapt/ modify the Questionnaire used in the assessment; to define a time line for a realistic implementation of the assessment; to draft a realistic Implementation Plan including activities, deadlines, responsible persons and assessment performance indicators; to coordinate the implementation, to periodically report to responsible persons on assessment implementation process, to prepare a Report on Assessment Outcomes and to recommend future steps based on the analysis.

*Required skills/ competencies:* Experience in project management; knowledgeable about the healthcare system, healthcare accountancy and healthcare record-keeping, previous experience in healthcare statistics and analytical report shall be considered as an advantage.

**Regional Coordinators** – shall have the responsibility to supervise the assessment implementation in each of the healthcare facilities within their territory scope (each of them will have to cover one of the four regions: northern, eastern, western, southern); to maintain continuous contact with the persons responsible for the assessment in each of the healthcare facilities; to provide guidelines, counsel and solutions to potentially difficult situations during the assessment implementation; accurately and precisely enter collected healthcare facility data into the Econometric Model, remain open to consultations with the healthcare accountant; assist the leading coordinator in the preparation of reports.

*Required skills/ competencies:* Previous cooperation in or with a healthcare facility, knowledgeable about healthcare facility structure/ operation, medical record-keeping, statistics and accountancy of outstanding importance; previous experience in collection of data, inserting data in Excel and analysis thereof should be considered as an advantage.

**Accountant**– shall have the responsibility to work with the Econometric Model and calculate expenses for each healthcare facility on a service line level, unit line level and facility level. The accountant shall also create several scenarios as follows: the costing of healthcare services if non-medical staff were to be reduced, if more sophisticated equipment was to be procured, if the stay were to be reduced and number of patients increased. The outcome of these calculations shall be submitted to the Leading Coordinator for analysis; the Leading Coordinator shall prepare a Report for the responsible persons in the Ministry/ Fund.

*Necessary skills/ competencies:* familiarization with the healthcare sector; understanding of international accountancy standards; knowledge about the accounting system and practices used in public health, Excel charting; experience with Econometric Models; experience in reporting.

The initiator’s Team and Leader of the healthcare costing assessment should be complemented with a team of healthcare facilities. Each healthcare facility should appoint a person to act as contact persons to the Assessment Coordinator, one person responsible for all accountancy data; leading nurse; heads of departments in the facility; if necessary the host shall also be engaged; pharmacist; sterilization employee; radiologist, lab technician and intensive care nurse. Detailed account of healthcare facility employees participating in the assessment and main competencies/ responsibilities under the section of the Manual dealing with data collection shall also be required.

### **3. Equipment and Materials Necessary for the Costing of Healthcare Services**

The implementation of the costing of healthcare services does not require special equipment and materials.

The Econometric Model shall use the Microsoft Excel spreadsheet program. In order to fill in the Questionnaire one would need a printing paper, toner and a writing pen/pencil. In reference to keying in data only one personal computer shall be required having had Excel and Word application installed.

## 4. Time Frame for Assessment Implementation

The very activity of data collection and analysis should not exceed one month, taking into account the fact for this type of data medical and accountancy record-keeping already exists.

Within the first week the planning of distribution of the Questionnaire to all public healthcare facilities should be carried out; to allocate assignments for all responsible persons within their designated Manual sections; to define deadlines of submittal of data by the responsible persons.

During the second and third week the collection of data should be performed. If certain inconsistencies or constraints emerge in the course of the assessment implementation, the regional coordinators should be contacted.

During the fourth week, data in the Econometric Model should be inserted and the analysis should be prepared.

## 5. Questionnaire

The Questionnaire should use simple language and should be user friendly. It consists of six parts:

1. Basic information about the facility/ Facility profile
2. Infrastructure and physical description of the facility
3. Fixed assets
4. Activities description
5. Information on personnel
6. Other recurrent costs

Each sector can be filled in by one or more persons dealing with this type of information on a daily basis. The next chapter of the Manual provides detailed definition on data which are to be inserted in the Questionnaire for each of its distinctive six parts. There, one can find clarification on the requirement of each type of information/data as well as the corresponding contact person within the healthcare facility. The next chapter shall also direct the method of Questionnaire's data input in the Excel file so as to be relevant to the Econometric Model of healthcare service costing.

**IMPORTANT:** The Questionnaire shall display previous year's data (or the last year of submitted final statement). If the Questionnaire contains inserted data which are not current and apply for a period lesser than a year (statistics for a certain month, week or like) you shall be kindly instructed to precisely defined that period.

## 6. Collecting Healthcare Facility Data

### 6.1. Basic information about the facility/ Facility profile

Firstly, a person responsible for the assessment implementation and collection of all data referring to departments and responsible personnel should be designated for each healthcare facility. Former experience has revealed that it can be practical to appoint the Chief Nurse or the Secretary of the Director as a responsible person due to their job description as a result of which they maintain everyday contact with the majority of personnel and can effortlessly gather all necessary data. However, the decision on the appointment of the responsible persons should be left at your discretion.

The starting point shall be Initial Chapter's data. This Chapter contains basic information about the facility: name, address, telephone, fax and e-mail. This section should also contain information on interviewee's as well as interviewee's contact number. It is crucial to introduce the source of all information in each of the Questionnaire's Chapters in order to identify the source of potential discrepancies.

Why is such data required?

This shall be the identification card of the facility. If noncompliance exists, or a need for clarification of inserted Questionnaire's data, one should know who, where, how, and when to clarify incompliant Questionnaire's data.

Responsible person for filling out this Chapter should be the very person responsible for filling out the overall Questionnaire and simultaneously be the contact person of the healthcare facility along with the Regional Coordinator.

### 6.2. Infrastructure and physical description of the facility

The second Chapter of the Questionnaire should contain data referring to the establishment of the facility, the size of the facility as well as last year of submitted final statement for its financial operation.

#### 6.2.1 Infrastructure

In separate sections of this Chapter, data referring to the size of each segment of the facility (applies for health homes as well): the practices, the clinical capacities (laboratory, imaging, pharmacy) and the administration capacities should be inserted. In the course of entering data, it is recommended to bear in mind the dimensions expressed in the original blueprints of the healthcare facility.

For general hospitals, specialist hospitals as well as inpatient clinics, the size of each of the wards/departments, number of hospital rooms, number of beds within departments should be recorded. Also, it is recommended to bear in mind the dimensions expressed in the original blueprints or the geometer documentation as applied during a separation (applicable for the Clinical Center)

Same should be applied in the course of entering data of physical description of the clinical capacities: imaging, pharmacy, laboratory, intensive care etc.

If the healthcare facility does not have original blueprints, each premise should be manually metered

Along the size of each premise, the current market value thereof should also be recorded. In order to identify the market value of the healthcare facility property it is best to consult a real-estate agency or look up ads dealing with real estate.

**IMPORTANT:** If the physical capacity is shared with another healthcare facility or other public facility, the premises should be precisely described (size of shared space, the value of shared space, maintenance costs of shared space, letting agent and amount of rent, etc.)

Why is such data required?

The calculation of the value of provided healthcare services encompasses the value of the facility's property. For its maintenance, refurbishing etc., the value should be included in the facility's overhead and reflected in the cost of services contributing to generating revenues.

Responsible person for collection of such data might be the host provided the healthcare facility has one or the operating accountancy person.

## 6.2.2. Available equipment

This section of the Questionnaire shall deal with data on the type of available immobile technology (x-rays, laboratory, ultrasound, central air-conditioning etc.), and other static utilized medical equipment within the building. Each individual piece of equipment should be recorded for each ward/ department separately. If the equipment is shared with another institution, an account should be provided for each specific piece of equipment owned by your facility.

The value of the equipment should also be registered. The entered value should not reflect the purchased or the depreciation value, but the current value if that piece of equipment was to be replaced today (current purchase value of equipment). If handling obsolete equipment or equipment no longer manufactured and thus unnecessary, the current value of the best replacement equipment piece should be registered. Best source on costing of machinery should be either the producer or the internet. In addition, units/pieces of available equipment should also be recorded in the Questionnaire.

Why is such data required?

The equipment, its value and degree of sophistication is considered as one of the indicators of care efficiency in the healthcare facility, the quality of service as well as the costing of healthcare services which should reflect the equipment maintenance or potential replacement costs.

The practical solution to appointing a responsible person is to select the equipment maintenance person. Some clinics/ hospitals/health homes have employed an engineer. Yet, in all healthcare facilities the equipment is registered in the operational accountancy unit thus all data can be acquired by the accountant.

### **6.3. Fixed Assets of the Facility**

Each facility has its fixed assets enabling its operation. The fixed assets are the vehicles, ambulances etc.; the office equipment (desks, chairs, personal computers, closets etc.); fixture and fittings (roller blinds, air-conditioners, space heaters and like) as well as the plants (for heating, electricity, water supply, kitchen, laundry etc.). For all above stated, the type and quantity of equipment should be stated, as well as its current replacement value.

Why is such data required?

All fixed assets produce secondary expenses to the facility, which are to be divided by wards/ healthcare services according to the number of activities delivered in/for each of the wards/ number of provided services.

The practical solution to appointing a responsible person is to select the accountant in charge of the operational accountancy in the facility in cooperation with the procurement person in the facility.

### **6.4. Description of activities**

#### **6.4.1. Activities of Health Homes**

This segment of the Questionnaire has been divided in to parts: preventive services (immunization, systematic checks, monitoring of growth) and curative services (clinical services provided the health home offers home visits, emergency care etc.). For each of these services, annual total admission as well as average number of annual admissions per person should be recorded.

Why is such data required?

This type of data provides an account of the quantity of provided services, the type of services, their annual frequency as well as the served population size.

Responsible person for collection of such data might be the Chief Nurse coordinating the collection of data for every department.

### 6.4.1.1. Activities of clinical capacities of health homes

The clinical intermediate capacities (radiology, pharmacy, laboratory and pathology), if listed by the facility should provide data on number of analysis conducted by each department and their average value. Most frequently, this type of information can be found in the pharmacy log or the referral or the analysis result record.

Why is such data required?

These types of data are significant for identifying which department utilizes the intermediate capacities the most and appropriately whose costing services should cover operation expenses (primary and secondary) of the intermediate clinical capacities.

Responsible person for collection of these data from a practical point of view might be the Chief Nurse that will collect the relevant information from the contact persons in the laboratory, imaging and pharmacy and enter them in the Questionnaire.

### 6.4.2 Activities of general, special hospitals and clinics

The hospitals and clinics should also collect department line data. The activities of these institutions shall be identified by the means of several inpatient care indicators; number of available beds, number of annual admissions, average length of hospital stay (in days), mortality rate and bed occupancy in relation to number of days; indicators for outpatient healthcare; average length of patient treatment and number of annual admissions.

Outpatient care shall be analyzed in reference to the number of outpatient wards within a department, number of working days enabling outpatient visits, working hours, working minutes by admission, as well as total number of annual admissions.

Surgery services should fill in the section of the Questionnaire addressing the operation rooms: the type of room, type of available rooms (if shared among departments, precise division should be attained as to which ones and to what extent), quantity of working days performing surgery during the week, number of working hours in surgery during the week.

The Questionnaire shall collect data indicating the type of surgery intervention and shall differentiate between routine and complex interventions. This section shall require data indicating the minutes for each of the interventions as well as number of cases per annum (complex as well as routine) by department.

Likewise, the surgical services including critical care capacity or share such capacity with other departments/ hospitals/ clinics should submit data on number of intensive care dismissals and identification of post-intensive care units/ services; average length of intensive care stay; bed occupancy by day and percentage of bed occupancy. Some of these data are regularly submitted to the Republic Institute of Healthcare; however particular attention should be placed on patient dismissal location and the average length of intensive care.

Why is such data required?

These data shall provide us with the basic knowledge of provided services in the facility, the provided type of services, the treated population, the duration of the treatment and the annual rate of bed occupancy in the hospitals.

Responsible person for collection of such data might be the Chief Nurse collecting relevant records from the contact persons in each department (ward nurses or department heads) and report them in the Questionnaire.

#### **6.4.2.1 Activities of inpatient clinical capacities**

The Hospital Questionnaire seeks two types of data as regards to the clinical capacities in order to carry out two types of analysis. The first set of data addresses the total number of analysis/ tests conducted in each of the intermediate clinical capacities. The second set of data addresses the number of prescriptions/ tests in pharmacy/ laboratory/ pathology/ imaging/ sterilization/ disinfection/ physical therapy of each department and the value thereof.

Why is such data required?

These data are required in order to identify the overall activity and value of operation of intermediate clinical capacities so as to adequately distribute costs (primary and secondary) for the operation of the common intermediate clinical capacities among departments.

The Chief Nurse might be considered the most adequate responsible person that shall collect relevant records from the contact persons in laboratory, pharmacy, intensive care and imaging and present them in the Questionnaire.

### **6.5. Personnel data**

The personnel expenses shall be analyzed in the following Chapter of the Questionnaire. This Chapter collects data for the overhead of personnel, number of general physicians, specialists, lab technicians, radiologists, nurses and administration allocated by departments; their gross pay and other allowances as well as data on time schedule of personnel engagement (medical personnel).

Why is such data required?

The personnel expenditure is one of the major items of overheads in provision of healthcare services. In order to have an account of level of effectiveness in the utilization of human capacities in healthcare but also the time allocation to personnel in delivery of healthcare services, staffing costs are essential in defining the costing of the healthcare services.

Responsible person for collection of data shall be the Accountant that pays out salaries and the Chief Nurse accustomed to the medical personnel schedule by departments

## 6.6. Other fixed costs

At the end, the Questionnaire focuses on the fixed costs. The data in this section as well as in the remainder of the Questionnaire shall be reported for the previous fiscal year for which a final statement has been submitted. The fixed costs are divided into several portions:

### 1. Clinical procurement and stocks

This section shall contain medical material procurement costs; pharmaceutical stocks, medical gases; disinfection/ sterilization items, radiology material etc.

IMPORTANT: in the first column the amount of received bills (only for previous year ones) should be inserted for each group of clinical procurement and stocks (pharmaceutical stock, radiological materials and like); in the second column the amount of paid bills should be inserted (for incurred costs only in the previous year); and the third column should contain the amount of unpaid bills (arrears for the previous year)

### 2. Property costs

This section should contain the utility costs for the healthcare facility (utilized electricity, rent, water, communal service and fuel).

IMPORTANT: Again in the first column the total value of the used electricity, water, fuel should be inserted for the previous year; in the second column the amount of paid bills in the previous year for each of the utility items; and in the last third column the value of the unpaid bills/ arrears in the past year.

### 3. Maintenance costs

This section shall contain maintenance costs for the facility buildings; the medical and non-medical equipment as well as the consumables necessary for the inpatient care (linen, dishes etc.)

IMPORTANT: please follow the above stated instructions for inserting the item based values for each of the columns.

### 4. Transport and traveling costs

This section shall include the traveling costs, per-diems and like, and the above stated instructions, amount-wise, should be taken into consideration while filling in the Questionnaire.

### 5. Communication costs

In this section of the Questionnaire, the telephone, internet, postal and similar costs should be reported taking into consideration the above stated instructions as regards to the amounts.

## 6. Other costs

This section shall address data related to the remuneration on the basis of signed contracts, court expenses, insurance and other expenditure not mentioned in the previous Chapters.

## 7. INDIVIDUAL FACILITY COSTING

The purpose of the costing model is to determine the average cost per bed day or outpatient visit at specialty level for an individual facility. The costing at facility level is to be performed for a year, which should usually coincide with a fully completed financial year.

### 7.1. Costing Methodology

A facility costing is based on a three step absorption costing methodology. The Stages of the three step costing methodology is as follows:

- Facility overheads e.g administration costs are apportioned to other departments
- Support costs e.g kitchen, medical gases etc are apportioned to clinical support and final output departments.
- Apportionment of clinical support costs (intermediate departments) to final output departments

As far as possible, costs are recorded for each final output department directly from the information obtained from the survey. To these direct costs is added the costs apportioned using the three step methodology described above to obtain the final cost for the department. This final cost is divided by the activity (bed days for in patient and visit for outpatients) to obtain the cost per activity.

Final output departments are the outpatient and inpatient departments in the facility. These are usually specialty or sub-specialty based.

### 7.2. Key Costing Concepts

#### 7.2.1. Direct, Indirect and Overhead Costs

**Direct costs** are those which can be directly attributed to the particular cost centre or patient. For example, the cost of drugs incurred by a doctor or paediatrics may be directly attributed by the pharmacy system. Hence, drugs could be a direct cost of paediatrics.

**Indirect costs** are those costs which cannot be directly allocated to a particular cost centre but can usually be shared over a number of them. Indirect costs need to be allocated to the relevant cost centres. For example, there may be no method of directly allocating laundry costs to a particular cost centre and therefore laundry costs are an indirect cost to a number of cost centres.

**Overhead costs** are the costs of support services that contribute to the effective running of a health care facility. Overhead costs may include the costs of general administration, finance and the general maintenance of grounds and buildings. They need to

be apportioned on a consistent and logical basis. Where such services are shared with other facilities, care should be taken to ensure the relevant proportions are identified to the relevant services. These proportions **must be reviewed annually** as utilisation of these services will vary.

### 7.2.2. Fixed, Semi – fixed and Variable costs

Costs are generally classified under one of the following categories:

#### Fixed

These costs are not affected by in-year changes in activity. For example costs such as rent and rates.

#### Semi-fixed

These costs are fixed for a given level of activity but change in steps, when activity levels exceed or fall below these given levels. For example costs such as nursing staff.

#### Variable

These costs vary directly with changes in activity. For example costs such as drugs.

## 7.3. Populating the Costing Model

The basic source of information to be used to populate the costing model is from the survey instrument. The data recorded in the survey instrument is analysed by section and department before they are recorded in the costing model.

### 7.3.1. Infrastructure and physical facility details

Information of the square meters for each department is recorded in **column M (Space)** in the costing model. It is important to ensure that all departments within the facility is captured. If a building is being used by two departments, this should be divided and recorded for each department.

The construction cost for each department is determined by multiplying the area (square meters) by the average cost of construction per square meter. This is recorded for each department in the costing model in **column I (Construction)** of the costing model.

The costing of services includes the use of facilities. This is reflected within the costing model by **the annual facility cost**, which is determined by dividing the construction cost by the useful life of the building. This annual facility cost is recorded in the costing model in **column K (annualised construction)** in the costing model.

The number of in patient beds for each department is recorded in **column R (Beds)** of the costing model

### 7.3.2. Fixed Assets

The assets that are owned by the facility should be listed for each department using the replacement cost (if not available, use purchase cost) in the sheet labelled 'Equipment List' in the costing model. The total value of the equipment for each department is recorded in **column H (Equipment)** in the costing model.

The useful economic lives of the assets should be recorded for each asset and the annual cost of utilisation of each asset (depreciation) should be determined by dividing the equipment cost by the useful life. The annual equipment cost is recorded in **column L (annualised facilities)** of the costing model.

### 7.3.3. Activity Details

The activity obtained from the survey is initially recorded in the sheet called AOL & Beds in the costing model. This is transferred into the main costing model as follows:

- In patient admissions should be recorded in **column U (admissions)** in the costing model by department. It is important to ensure that all in patient departments with beds (see a above) also have admissions for the year.

- Average length of stay (ALOS) for inpatients in each department should be recorded in **column S (ALOS)** in the costing model.

- **Bed days Column W** for inpatient departments is determined by multiplying the admissions (column U) by the ALOS (column S). Check the reasonableness of the Bed days figure by comparing the capacity for the department against the bed days. The capacity of department is obtained by multiplying the number of beds by 365.

- Outpatient visits for each outpatient department is recorded in **column X (Visits)** of the model.

- The utilisation of activity for intermediate departments (e.g - pharmacy, physiotherapy, CSSD, pathology and radiology etc) by value is recorded in columns Y to AI of the costing model. This information is important for a costing exercise as it is used to apportion the cost of these intermediate departments to the final inpatient and outpatient departments.

It was not possible to obtain this information during the exercise from most facilities. This is because most facilities do not have a computerised system which can report the utilisation of the intermediate department services by the final inpatient and outpatient departments.

For costing purposes, a sample of days for each intermediate department can be taken and their utilisation analysed and valued. This can be used as the basis of the final apportionment of the cost of the department to the final departments.

### 7.3.4. Staffing Information

Information on staffing cost per annum by department is recorded in **column C (Staff)** of the costing model. The sheet labelled staff salary is used to record information on staff costs obtained from the survey. The total cost for each department is transferred into column C in the costing model (subject to adjustment for clinical staff below)

For a typical facility, clinical staffs spend a proportion of their time in inpatient, general outpatient, specialist clinics, theatres, and some administration work. It is therefore necessary to apportion their annual cost between these activities. The clinical staffs who usually work for different departments include Specialists (consultants), Doctors and sometimes Nurses

The sheet labelled **staff time and utilisation** is used to apportion the costs of these clinical staff. For the cost of specialists the costs splits should be performed in accordance with their specialties (E.g - General Surgeons, Orthopaedics, Paediatrics, etc). This will enable the apportioned costs to be recorded for the final departments to which these specialists belong to.

### 7.3.5. Recurrent Expenditure

Recurrent expenditure incurred by the facility in the year is recorded in columns D (drugs and Medical supplies), E (operations and maintenance) and F (other recurrent fixed costs) in the costing model.

- **Column D** is used to record the total cost incurred on Drugs, laboratory (pathology) supplies, radiology supplies, medical gases, physiotherapy supplies, food and catering supplies etc. These should be recorded for each department.

- **Column E** is used to record other annual recurrent costs that are not fixed. It is best to record this information for each department if this is available. This is usually the case if the facility maintained separate records to be able to capture this information for each department for e.g by having separate meters for electricity etc.

If the direct departmental cost by department is not available, the best methodology is by apportioning these costs using a basis that reflect their possible utilisation within the facility. For example electricity costs could be apportioned using either the size of each department or the energy consumption per unit of equipment. Rent is usually apportioned to each department using the size in square metres.

It should be noted, however, that such detailed departmental or apportionment can be time consuming and expensive to do. Therefore these costs can be recorded as part of general administration costs in column E.

- **Column F** is used to record fixed recurrent costs. As with other costs, information should be recorded for each department if this is available. If this is not available, then these costs should be recorded as part of facility overheads against general administration of other overheads.

Appendix 1 provides a proposed classification of annual recurrent costs between columns D, E and F in the costing model.

## **7.4. Apportionment of Overheads, Support and Clinical support (intermediate) costs**

As described above, the costing model is used apportion costs to the final output departments in three stages. The definition of a final output department is based on the final treatment department which patients receive services and are discharged from the facility. These are usually inpatient and outpatient departments. These inpatient and outpatient departments are specialty or sub-specialty based and should match the type of services provided by the facility.

### **7.4.1. Apportionment of overheads costs to the rest of departments – Stage 1**

Overhead departments include general administration, security, finance, human resources department, generator and maintenance department and similar facilities.

The total cost for each department after recording all the costs information obtained through the survey is shown in **column Q (Total)** in the costing model.

The costing model uses the area in square meters in the apportionment of total facility overheads costs (**Column Q for the overhead departments**) to the remaining departments within the facility. Therefore each of the remaining departments in the facility will have a proportion of the overhead costs apportioned to it in accordance with its size (**Column M**) to the rest of the departments (Total of Column M, less the square metres of the overhead departments).

The basis of apportionment used above is based on a general absorption methodology. There are equally good basis that can be used to apportion specific aspects of overhead costs. For example, the cost of human resources department can be apportioned using the number of staff in the rest of the departments within the facility.

This is Stage 1 in the three step process. At the end of this stage, all the costs for the overhead departments become zero as they have been apportioned to the other departments in the facility.

### **7.4.2. Apportionment of support costs to remaining departments – Stage 2**

Support costs include kitchen, laundry, mortuary, biomedical engineering, gas supply, and transport and similar departments in a facility.

The Costs for the support departments (**Cells AK 8 to 13**) are also apportioned on the same basis as those of the overhead departments (ie using departmental area in square metres).

After the apportionment, the support costs become fully absorbed into clinical support (intermediate) and final output departments (ie become zero).

### 7.4.3. Apportionment of Intermediate costs (clinical support costs) to final output departments – Stage 3

The costs for the clinical support costs (intermediate departments) are allocated to the final output departments using the value of the utilisation of those individual departments by each of the final departments. This requires individual apportionment of each intermediate department cost (in column AK) to the final departments using the value of utilisation recorded in columns Y to AI in the costing model.

Frequently, most facilities do not keep information regarding the utilisation of the services of intermediate departments by the final outputs departments. This is the situation in Macedonia. In such situations, the costs for the intermediate departments are apportioned to the final output departments using the adjusted bed days for the final output departments.

The bed day for inpatient departments is the product of the admissions and average length of stay. Activity for outpatient departments is expressed in outpatient visits (**Column X**). This needs to be converted into bed days. The outpatient visit is converted into bed days by dividing them by the number of outpatient days that equate to an inpatient day in terms of consumption of services of the facility. This number of days can differ from one outpatient service to another and from one facility to another. For the purpose of the Macedonia costing an international benchmark of 5 outpatient days to one inpatient day was used (this can be changed to a country or facility specific, if the information becomes available). This is recorded in **column W** for the relevant outpatient departments.

The intermediate department costs are therefore apportioned to the final output departments using the proportion of the bed days in column W. This gives the fully absorbed cost for each final output department.

### 7.4.4. Determining the average cost of treatment

The final costs for each output departments are then divided by the relevant activity for each department to obtain the average cost of treatment. Inpatient cost per bed day is obtained by dividing the final cost ( for the inpatient departments) in **column AL** by the bed days in **column W**. The inpatient cost per inpatient admission is obtained by dividing the cost in column AL by the admissions in **column U**.

The average cost per outpatient visit is obtained by dividing the final cost for each outpatient department in **column AL** by the outpatient visits in **column X**.

## **7.5. Performing Scenario analysis at individual facility level**

Scenario planning at individual facility can be performed at a general level or individual specialty level. General level scenarios affect all the final output departments for the facility. These are usually expressed in percentage changes. Specific scenario planning only affects a specific specialty or department. Scenario planning is performed using the results sheet in the costing model workbook. These are usually in absolute changes.

### **7.5.1. Assumptions on cost behaviour**

The financial implications of scenario modelling are based on the assumptions of cost behaviour. These assumptions determine the main cost drivers for the final output departments and support departments. These assumptions are used to model the financial impact of cost changes resulting from the scenario being modelled.

The assumptions are entered using the assumption sheet in the costing work book. The assumptions are recorded for each of variable, semi-variable and fixed cost. The percentage of cost drivers for each type of cost is used. For example variable costs change in accordance with activity, therefore the cost driver will be 100% of adjusted bed days (ie final activity). The cost drivers for Semi-variable costs are partly activity based and partly depend on other factors e.g beds, space etc.

The output of the scenario planning will be based on these assumptions.

### **7.5.2. General scenario planning**

General scenario planning can be performed on length of stay, admissions, bed numbers and space by putting in the required scenario into cells S9 to S12 as appropriate in the results sheet. Increases should be recorded as positive. (e.g 10% increase in length of stay should be recorded as 10 in cell S9). If for example a general improvement in average length of stay by 10% is being planned, this should be entered as -10 in cell S9. The effect on the final cost for the facility as well as the cost per activity (ie bed day) is calculated by the model and displayed in columns I to O on the results sheet.

### **7.5.3. Specific Scenario planning**

Specific scenario planning can be performed by making individual scenario changes using cells F7 to H49 for each specific department as required. As with the general scenario planning, increases should be entered as positive. The result for the scenario is calculated and displayed by the costing model in columns I to O on the results sheet.

Another advantage for a specific scenario planning is that it can be used to model the impact of closing a final output department, but this cannot be done using the general scenario planning.

Specific scenario planning at facility level is important in determining the impact of specific changes to individual services especially if those services are above average in terms of efficiency to similar facilities in the country.

## 8. AVERAGING OF FACILITY COSTS

The next stage towards a development of a macro model is to average out the costs for the facilities sampled. The averaging is performed for facilities which provide similar services. For the Macedonian experience, this means averaging the costs for the facilities that were sampled into the following groups:

- Health Houses (except Skopje)
- General Hospitals
- General Hospitals (special)

Due to its size and number of satellites run by the Skopje Health House, the costs for this facility was excluded from the average for the Health Houses. It was our view that to include the cost will cause a significant distortion of the average and overall cost for health houses.

The averaging also excludes the figures for clinics as each of them is unique in terms of the nature of service provided.

The averaging process is performed with a workbook in which all the final costing sheets from the individual facilities that were sampled are copied into. It is important to make sure that all the departments for each facility are lined up on the same line numbers to enable them to be aggregated together.

A total sheet is inserted with the same format as the facilities with the same columns and rows. The average for the costs and activities for the number of facilities surveyed is calculated in the **Total** sheet. This will enable the model to compute the overall average cost per activity for each final output department.

### 8.1. Uses of the averaging output

The average cost per bed day or outpatient visit is valuable for planning purposes. It will enable the Ministry of Health to determine facilities that are outliers in terms of the cost of service they provide. It will also provide other qualitative information like the average length of stay for each specialty for the same type of facility.

The above information will enable benchmarking to be performed for facilities providing similar services. This will be valuable for Macro modelling and scenario planning and will enable the impact of activity shifts between different types of facilities (e.g. between General Hospitals and General Hospitals special)

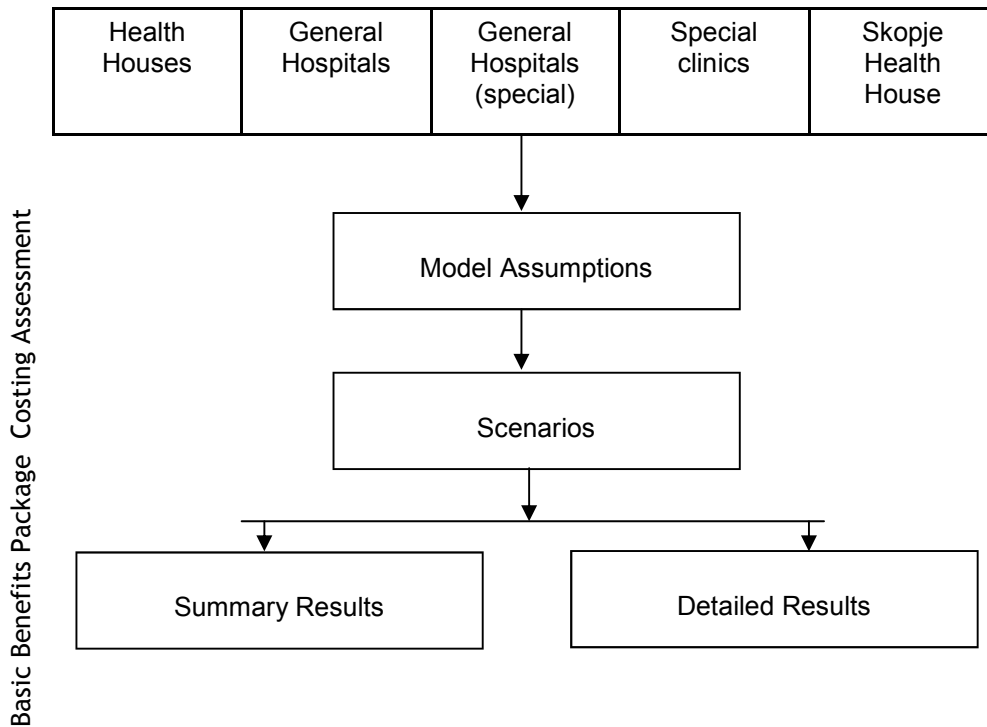
## 9. MACRO MODELLING

The basic purpose for macro modelling is to estimate the overall cost for the health system based on the number of facilities available in the country from a survey sample. It assumes that facilities providing similar services also have similar cost structures, therefore it will be possible to project the total cost based on data from the sample of facilities.

Macro modelling also allows for scenario planning based on general or specific scenarios. General scenarios model the overall impact based on a single change across all facilities at a similar level. Specific macro modelling is based on changes to specific service lines.

### 9.1. Populating the macro model

Information from the average cost for the different levels of facilities is the main source of information for the macro model. The Macro model is menu driven to help data input and easy navigation. The main menu for the macro level is as shown below:



By clicking on the different tabs for the types of facilities, the model takes the user to the specific data entry sheet for the type of facility. The information to be input into the data entry sheet is labelled with yellow cells. This information is from the **Total Sheet** of the averaging model. This exercise is repeated until all the data for the Health Houses, general Hospitals and General Hospital (special) are recorded.

Data for Skopje Health House is loaded on its own. The data for clinics is recorded using single lines for each clinic as they cannot be amalgamated.

## 9.2. Model Assumptions

The assumptions for the macro model are crucial in getting the final output correct. By clicking on the assumptions tab, the screen will open up and reveal details of the assumptions that are required.

Two types of assumptions need to be specified:

### 9.2.1. Base assumptions

- Base assumptions require the following information to be specified:
- The number of facilities sampled for Health Houses, general hospitals, General Hospitals (special) Clinics and Skopje Health House.
- The number of facilities available in the country for each of the group of facilities sampled.
- The adjustment required to provide for debt in order to restate the costs from cash basis to accruals basis. This information is required as all the facilities use cash accounting to report their annual expenditure. The amount to be entered **is a percentage** adjustment to the annual costs to reflect the fact that some of the expenditure for the year are not paid and are not included within the reported costs. This adjustment will not be required if facilities move to use accrual accounting. It can also be left blank if it is decided that adjustment is not required.
- The population in catchment area for the facilities sampled. This information will be used to project the cost for the facilities sampled into a national picture.
- The projection for overall National cost can be set to use population base or a number of facilities. If a number of facilities is chosen, then the model will project the national costs using the average cost per facility.
- Annualised capital cost – the assumption can be set to determine whether annualised capital cost should be included in the costing or not.
- Inpatient intensity to an outpatient visit. This is the number of outpatient visits that is equivalent to an inpatient bed day. The benchmark used for the modelling is 5. However, this can be changed as necessary.

## 9.2.2. Scenario Cost Drivers

The cost drivers determine the main causes for changes in costs for variable, semi-variable and fixed costs for both direct patient care departments and indirect departments.

### 9.2.2.1. Direct Patient Care Departments

These departments are the same as the final output departments.

The assumptions required are as in the table below:

<i>Cost Driver</i>	<i>Cost type</i>		
	<b>Variable costs</b>	<b>Semi- variable costs</b>	<b>Fixed costs</b>
Space		10	30
Beds		80	
Adjusted Bed days	100	0	
Unchanged (residual)		10	70

In the table above, the assumption is that variable costs are 100% likely to be changed in line with change in activity (adjusted bed days) etc.

### 9.2.2.2. Indirect Patient care Departments

These departments include support and overhead departments.

<i>Cost Driver</i>	<i>Cost type</i>		
	<b>Variable costs</b>	<b>Semi- variable costs</b>	<b>Fixed costs</b>
Space			20
All Beds			40
All Adjusted Bed days	60	30	0
Unchanged (residual)	40	70	40

The cost drivers for support drivers are less likely to be activity based. These assumptions can be changed as necessary.

After completing the assumptions the entries need to be saved before exit so that they can take effect.

These cost driver assumptions will be used by the macro model to work out the cost implications for scenario analysis.

### **9.3. Scenario Modelling**

Scenario modelling can be accessed via the scenarios tab on the main menu. As with individual facility scenario modelling, there are two levels of scenario modelling that can be performed with the Macro model:

#### **9.3.1. General scenario Modelling**

General scenario planning can be performed on the following:

- Change in average length of stay
- Change in admissions
- Change in outpatient attendances
- Change in bed numbers
- Change in the number of facilities

The above scenario modelling can be performed for each level of facility. This means that each of the above can be modelled independently of the others or in a combination with other scenarios. Scenario modelling for admissions and beds cannot be performed for Health Houses since they do not have in patient activity. The General scenarios are entered as percentages apart from the number of facilities which is entered as absolute numbers. Increases should be recorded as positive. (e.g 10% increase in length of stay should be recorded as 10). If for example a general improvement in average length of stay by 10% is being planned, this should be entered as -10.

After entering the required General scenario required, this should be saved by clicking on save *and calculate* button.

The results showing the impact of the scenario can be displayed by clicking the show summary results or detailed results tab (depending on the results required).

A scenario modelling action can be aborted by pressing on the *cancel and leave* button.

### 9.3.2. Detailed Scenario Modelling

Detailed scenario modelling can be performed for each of the facility types individually. On selecting detailed scenarios, a sub menu appears as follows:

- General Hospitals
- Health Houses
- General Hospitals (special)
- Skopje Health House
- Return

A user can select the facility type the detailed scenario modelling is required. This will take the user to the detailed changes sheet. Detailed scenario changes can be performed for ALOS, Patients and bed changes by department for the type of facility in columns B to D in the detailed changes sheet in the yellow cells. In detailed scenario modelling, the required changed should be input in absolute numbers.

After entering the scenario changes required, the user can return to the main menu.

If both general scenarios and detailed scenarios are entered, the general scenario figures will override the detailed ones. In such case, the output that is displayed will be based on the general scenarios.

## 9.4. Displaying Results for Macro Modelling

Macro modelling results can be viewed at either a summary level or detailed level.

### 9.4.1. Summary results

Summary results provide the total cost for each type of facility based on the assumptions that have been specified, as well as the overall cost for the country based on the projections using the average costs for each type of facility and the overall number of facilities or population as specified.

The summary results sheet will also display the summary output for the scenarios specified for each type of facility as well as for the country as a whole.

### 9.4.2. Detailed results

Selecting detailed results tab will provide a list of facility types as in the detailed scenarios. Selecting the type of facility will display the detailed results for that type of facility. Detailed results also provide the scenario result for that type of facility.

The advantage of detailed result display is that it enables the cost per activity type to be seen, which is not available at the summary level. However, the detailed results can only be used for each type of facility on its own and cannot display the overall total for the country.

Appendix 1 Recording of Annual recurrent Expenditure

<b>Expenditure</b>	<b>Drugs &amp; other medical supplies</b>	<b>Operations &amp; maintenance</b>	<b>Other recurrent fixed costs</b>
<b>Clinical Supplies</b>			
Pharmacy Supplies			
Pathology reagents and supplies			
Dental supplies			
Medical gases			
Physiotherapy supplies			
Radiology Supplies			
CSSD Supplies			
Theatre supplies			
Food and beverage supplies			
Others			
.....			
<b>Property Expenses</b>			
Rent and rates			
Electricity			
Fuel and Oil			
Oxygen/Gas			
Water Supplies			
Waste Management			
.....			
<b>Maintenance Expenses</b>			
Maintenance of Medical Equipment			
Maintenance of Cold Chain Equipment			
Maintenance of Buildings			

Basic Benefits Package Costing Assessment

Maintenance of plant			
Maintenance of dental equipment			
Cleaning Expenses			
Gardening costs			
Laundry costs			
Bedding and Linen Supplies			
Catering Crockery			
Others			
<b>Transportation and travel expenses</b>			
Travelling and Transportation expenses			
Motor Vehicle Maintenance & Licences			
Others			
<b><u>Communications:</u></b>			
Telephone Expenses			
Internet/Other communications			
Printing and stationery			
Others			
<b><u>Other Expenses</u></b>			
Insurance			
Professional and consultancy fees			
Bank charges and interest			
Advertising			
Marketing and promotions			
Miscellaneous expenses			

Bad Debts, waiver and welfare			
Others(please specify)			
<b>Depreciation</b>	These costs are replaced by the annual facility and equipment costs		
Buildings			
Medical Equipment			
Motor vehicles			
Plant and Machinery			
Fixtures and Fittings			
Computer and office equipment			



