THE BURDEN OF CANCER IN BASRAH
THE STATE OF THE ART

-First Report-

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A report compiled in collaboration with the following institutions :
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Basrah October 2006

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PREFACE

Planning as a process of identification of problems and priorities, setting objectives, exploring and selecting strategies and implementing the most rele vant programmes, is a scientific and systematic process. At each and every stage of the process, sound and reliable data are needed. This is certainly the case for effective handling of any significant public health problem. Therefore, the handling of the problem of cancer in Basrah must start with the creation of an effective mechanism to collect, analyze and present reliable indicators on incidence, distribution, determinants and fatality of cancer. Sporadic, disintegrated and ad hoc works are beneficial by themselves but can not guarantee continuity and comprehensiveness of long standin g programmes to deal with such potentially growing health problem. Multidisplinary, multisectorial approach with sustainable mechanisms is the only rational and fruitful way to succeed in this context. ***The success of all proposed activities is also dependent on the successful "cultivation" of the spirit of team work and the recognition by all partners of the value of multidisciplinary approach to problem solving. Without these prerequisites, nothing significant is expected to be achieved and most efforts will remain turmoiling in a vicious circle.***

This report is the first scientific document of a team work research initiated in Basrah to deal with cancer. The project was endorsed by the Iraqi Ministry of Health (**Appendix 1**). The team members hope that the contents and the spirits of the work will encourage further steps towards the ultimate aim of creating an effective and reliable cancer registry in Basrah or Southern Iraq. The figures contained in the report refer to two separate research activities. In the first all new cancer cases diagnosed in Basrah during 2005 were included. The results covering new cases are amenable to rectification in the future if more cases related to 2005 are identified. We do believe however, that the figures given in this report represent the best epidemiological profile of risk of cancer in Basrah in 2005. The second research is on cancer related mortality in Basrah during three years 1989, 1997 and 2005.

Results related to incidence and mortality are presented as frequencies , relative frequencies, specific incidence rates, specific mortality rates and time trends. An attempt was also made to calculate survival rates. The bulk of the results is included in Section 4) Additional results are given in **Appendix 2.** No rigorous interpretation of the results is attempted. Instead we present available facts as they are at the present stage of the project. Making sound conclusions about the changing pattern of cancer in Basrah and any determinants requires further efforts and more valid data. However, this does not undermine the efforts made to prepare this report or to believe that the data on which the report is based are not valid. It is rather a warning to any one who may make some faulty judgment about cancer in Basrah. The authors still believe that there are some gaps in the data base of cancer and these gaps, though might be small, they are necessary to complete the epidemiological picture.

ACKNOWLEDGEMENTS

The editors express their gratefulness to every member of the research t eam, who worked in calm but in fruitful manner, to the members of the consulta tion team, to all colleagues who support and/or contribute morally to the work.
Professor Thamer A. Hamdan, Dean of College of Medicine deserves special thanks for his scientific and administrative support to the project and his strong stance in favour of creating schools of thought. He and his colleagues in the orthopedic department deserve high degree of respect
Special appreciation is also made of the active contribution from Dr. Yousif Gague of the faciomaxilary department in Basrah general hospital and to Dr Muayad Al-Rubaie, Director of Al-Sadr Teaching hospital who took a positive stance from the project.
Dr Wasan Al-Elwe, pathologist, Al-Sadr Teaching hospital is a faithful enthusiastic person without her hard work, good part of the data could not be easily compiled.
We are very grateful to our friends from Japan. Dr. Katsumi F and from Germany Professor Wolfgang Hoffmann- University of Griefswald, Professor Eberhard Grieser of Bremen University. Dr. A. Clausen of IPPNW-Germany and Dr. Claudia Terschuren – Griefswald University who provided tangible scientific, technical and moral support to the project.
The authors are grateful to the members of the Cancer Research Unit, College of Medicine for their support to the work and cooperation with the research team.
Cancer patients and their families are the people for whom the spirit of this work is dedicated. We wish every one safe life and healthy living until the final norma l destiny.
Finally, the editors are grateful to Dr. Asaad Q Al-Yassen for his assistance in editorial aspects of the report and to Tariq OS Habib for his hard work in handling, checking, statistical assistance and typing of the manuscripts.

The Editors
Basrah, October 2006

1. BACKGROUND OF THE LOCAL SITUATION

Cancer is a growing problem world- wide [1]. Despite the great advances in science and technology, the aetiology of many types of cancer is still obscure and the role of specific risk factors in the causation of certain cancers is unresolved with substantial variation across the world [2,3]. The distribution of almost all diseases including cancer is not random neither across nations nor within individual nations, yet in many instances, the re asons behind such non-randomness are not always clear and the exact nature of geographical variation is hazy [4]. Iraq as whole and the southern region including Basrah in particular has been subjected to massive environmental damage as consequences of war s, economic embargo and lack of resources to protect or restore safe environment. As a result, the health status of the population was under high risk of various diseases including cancer. A number of researchers carried out research work on cancer incidence and mortality during the last ten years and reported some increase in both of these two indicators [5-7]. However, these research works have been under criticism by local researchers [8] and international Authors [9] for possible bias in their results. The critics suggest that the apparent increase could have been artificial due to better diagnosis, improved reporting and registration or the rise reflects changes in population size and age structure. Regardless of whether this apparent increase in risk of cancer in Basrah is real or artificial, the reported cases do not represent the true situation. At any previous year, case detection and registration is incomplete and fluctuating despite the initiation of official cancer registry in Basrah for more tha n a decade. From one point of view, many cases from inhabitants of Basrah may consult sources of care outside Basrah and are not registered with registration centres in Basrah at all. From the other point of view, a number of registered cases, though small , are not inhabitants of Basrah governorate. In addition, the population denominators are likely to have some errors partly because of population movement during the last 20 years or so. In the last three years, the situation became more complicated, when many of the expatriated Iraqis returned to the country. Their exact numbers might be very difficult to determine. Such complicated situation with the added security issues makes research a real adventure. In an attempt to improve the data base on cancer in Basrah, to estimate the risk of cancer and to enhance better health care for people at risk of cancer, a study plan was prepared [10]. This plan was then modified when a team of researchers from medical and related specialties initiated a **FOUR-LEGGED PROJECT.**

The four-legged project consists of

1. Measurement of environment pollution and mapping of major pollutants with specific emphasis on pollution with radioactive matters like depleted uranium.
2. Improvement of cancer registration and creation of population-based cancer data base (Population-based cancer registry.
3. Research to measure the extent of cancer in terms of incidence and mortality and to ascertain the relationship of cancer to possible risk factors including exposure to radioactive material. 4. Improvement of care provided to cancer patients at the level of structure (resources) process (investigation and treatment techniques) and outcome (better survival and quality of life).

2. PRACTICAL ACTIVITIES DURING 2005

Apart from efforts made during the last ten years by local care providers, local health authorities and a number of international NGOs to improve care for cancer patients, the following practical activities took place

Activity One

A ten-day seminar (Health and environment in post war Iraq) was held in Amman (Feb. 7-17, 2005) with support from DAAD, IPPNW, University of Bremen and University of Greifswald. Nine scientists from Basrah participated in this seminar. The seminar was a good opportunity to exchange information and expertise about cancer and environment pollution and to set the first significant step towards cancer registration and research in Basrah.

Activity Two

A number of scientific activities were carried out in Basrah (Lecture to faculty of Basrah Medical College, Report to the University of Basrah and a one-day seminar (19 April 2005) by the research team. The main question asked: **What can we do about cancer in Basrah? The participants agreed on the following points:**

1. During the last 20 years, extensive environmental damage took place in Iraq and Basrah in particular.
2. Such damage is likely to be associated with risk to health and life of people. Cancer is one important health problem.
3. The extent of pollution, cancer and the relationship of the two to each other is not well understood and defined.
4. The participants agreed that individual research activities are ineffective. Multidisciplinary teamwork is highly recommended

5. The participants agreed to take part in a "**FOUR-LEGGED PROJECT**" as researchers, consultants or co-coordinators in the project.

Activity Three

A full proposal covering the short term objectives of the four-legged project was prepared and submitted to the Ministry of Health and Ministry of Environment. A positive response and official endorsement was issued by the Ministry of Health on December 11, 2005. No response yet was obtained from the Ministry of Environment. A good support for the project is being given by Basrah Environmental Office. Two of their staff are members in the research team. The endorsement of the Ministry of Health made the project under official legal cover. The project is also supported by the Medical College and University of Basrah who facilitated the participation of research team in all the activities inside and outside Iraq.

Activity Four

Initiation of Cancer Registration Section at the Department of Pathology and Forensic Medicine, College of Medicine, University of Basrah. This section is supervised by a committee of histopathologists. It aims at registering every case of cancer diagnosed histopathologically and/or cytologically in Basrah. It records minimum items of information.

Activity Five

Two review papers were prepared on cancer and environment in Basrah.

1. Khalaf AA. Cancer trends of cancer after Gulf War. Clinical Medicine in Tomorrow 2005; 17: 3-11.
2. Habib OS. Environment and health in Southern Iraq: Facts and future prospects. Marina Mesopotamica 2006; 20:7-19.

The research team initiated immense activities during 2005 to improve conduct and outcome of cancer registration in Basrah. Coordinated work among five major partners took place despite the many constraints facing us. The five partners are:

1. The Cancer Registry at the Directorate General of Health in Basrah
2. The Cancer Registration Section at the Department of Pathology and Forensic Medicine, Basrah College of Medicine.
3. The Oncology Centre at Al-Sadr Teaching Hospital
4. The Oncology Ward at Basrah Maternity and Children Hospital
5. The Department of Community Medicine, Basrah College of Medicine

The collaborative work yielded substantial results on cancer identification, registration and analysis. The Cancer Registration Section published a report on its activity during 2005. More scientific work is going on.

3. PRACTICAL ACTIVITIES DURING 2006

Activity One:
A seminar **(Cancer Registration and Environmental Health Risk Assessment for the Population: Methods, Implementation and Analysis)** was held at the Institute of Community Medicine, University of Greifswald Feb 19-28 with the participation of 14 Iraqi scientists of different medical biological and physical specialties. The seminar was backed by highly specialized staff from Germany, Japan And Basrah (Iraq). The seminar was funded by The German DAAD and IPPNW. The seminar was planned for in a meeting held in Amman between two German and two Iraq scientists on November 14m, 2005.

Activity Two
One –day seminar in Basrah (March 27, 2006) was organized by the research team in collaboration with the College of Medicine. Fifty doctors of various specialties were invited to participate in the seminar. Three storming questions were raised in the seminar:

1. **Do you believe that cancer has increased in Basrah during the last 10 years or so? What is the evidence for your answer?**
2. **If cancer is really increasing in Basrah, how can you ascertain this increase? How can you identify the causes for such increase?**
3. **If cancer is not increasing, how can you explain the rise in registered cases for example from 488 in 1990 to 1604 in 2005 or by about 228%?**

At the end of the seminar, the Dean of Basrah Medical College and other senior doctors from the attendants appraised the work and proposed the initiation of "Cancer Council" in Basrah governorate. An expert meeting was held next day and two more activities were decided:
1. Another broader seminar is to be held later (May 28th, 2006). In this seminar, local experience with cancer and difficulties are to be presented by various medical specialists and a working paper (**Cancer and cancer registration in Basrah: Where we are now and where to go next?)** is to be presented for discussion.
2. A conference is to be held late in 2006 or early 2007, but this depends on security issues and financial support from local and international partners .

Activity Three
1. The coordinated work among the five partners mentioned above is continuing at least at the level achieved during 2005

2. Three scientific research works are underway. They are under the supervision of the Department of Community Medicine, College of Medicine, and University of Basrah in collaboration with the research team. All are planned to be preliminary studies The three studies are:

a. Breast cancer and life style risk factors: A case -Control study.
b. Risk factors of childhood cancer (leukaemia and lymphoma) in Basrah
c. Analysis of cancer mortality in Basrah: A record –based study

Activity Four

A one-day seminar under the slogan "The control of cancer contributes to better health" is planned to be held on May 28th, 2006. The seminar aimed at providing the opportunity for different medical specialists from Basrah to present their experience with cancer and the difficulties they face in their work. A working paper was put for discussion**.(See Appendix 3)** It was envisaged from the proceedings and discussions that participants would approve a strategy to deal with cancer in accordance with the four-legged project. At least three disciplines showed material support by sending short forms on cases of cancer diagnosed by them. These three disciplines are the orthopaedic surgeons group, the neurosurgeons group and the faciomaxilary surgery group

4. CANCER IN BASRAH: EXTENT OF THE PROBLEM

4.1. Sources of data and methods

The results presented in this paper are based on all cases of cancer which were diagnosed by histopathologists or haematologists in Basrah during 2005 and registered with the following institutions:

a. The Oncology center in Al-Sadr Teaching hospital, which is the main centre for registration of cases and administration of cytotoxic chemotherapy in southern Iraq.

b. Cancer registration section at the Department of Pathology and Forensic Medicine, College of Medicine. This section compiles the great majority of cancer cases which are diagnosed by histopathological methods.

c. Pediatrics' Oncology Ward in Basrah maternity and child hospital, which is responsible for the treatment of childhood malignancies.

d. Other sources. Some specialist doctors keep their own collection of cancer cases as part of their own routine clinical work. They were contacted and requested to provide a list of their cases. The main contributors in this aspect are orthpaedic surgeons, faciomaxilary surgeons and neurosurgeons .

All these sources are now cooperating with each other and with the research team to improve cancer detection and registration in Basrah. Lists obtained from various sources were typed first on an excel sheet. They were matched and

checked for any repetition resulting from cases being reported by more than one source. The data were then transmitted into An SPSS (Statistical Package for Social Science) computer file for statistical analysis. Two points are stressed here. The first is that we do not claim that the results presented in this report represent all cases of cancer in Basrah governorate. Rather we can claim that they represent the best achievement so far in this respect. The second is th at the registered cases are derived, in principle, from the inhabitants of Basrah, but some of them are inhabitants of other governorates who are diagnosed and or treated in Basrah. Great efforts were made to identify each and every case regarding the exact place of residence. However, misclassification can not be totally excluded. To compare time trends of registered cancer cases we used cases diagnosed and registered with the Cancer Registration Section at the Department of Pathology and Forensic Medicine during the years 1990, 1997, 1999 and 2005. Until the end of 2005, the records of this section did not distinguish cases by place of residence and consistently registered cases from within and from outside Basrah governorate. The restriction of cases used in the time trend analysis to this source was based on two assumptions:

1. The data for the four years are comparable with respect to criteria of diagnosis and extent of coverage.
2. The proportion of cases from outside Basrah is small and does not vary from year to year.

Estimation of epidemiological indicators of the extent of risk of cancer (age specific, sex specific, area specific incidence rates and other indicators) in Basrah governorate for the year 2005 was based on data available for 2005 from all sources after exclusion of cases from outside the governorate. The total cases registered with the Cancer Registration Section for the years 1990, 1997, 1999 and 2005 were 488, 544, 688 and 1327 in that order. These cases were used only once to describe the time trend as mentioned earlier. The total number of cases registered with all sources including the Cancer Registration section in 2005 was 1885 cases. It was possible to classify these cases into those who were inhabitants of Basrah governorate (1604 cases) and those who were inhabitants of other governorates (281 cases). The 1604 cases were used to estimate indicators of the extent of risk in Basrah in 2005.

Information related to population of Basrah were based on data available with Basrah Health Authorities, the electorate lists and the Statistical Office in Basrah [(11)]. The age structure was based on pooled results of 10 household surveys carried out in different parts of Basrah governorate during the last 12 years [(12-13)].

Regarding cancer deaths, data were compiled from all records of deaths in the city centre and other administrative units. The data on deaths related to cancer were obtained for three years; 1989 a relatively normal year for Basrah following the cessation of the Iraq-Iran war, 1997 the year which represented the end of the severest economic embargo (before the oil for food memorandum) and 2005 when economic embargo is no longer existing. The process of data compilation was labourious. It required the examination of available data on every death to

identify cases for which the cause of death was written as cancer . Two sources for data on death are available in Basrah: death certificates and death registries (death inventories). The two sources generally contain the same range of variables on each case (Name, age at the time of death, sex, place of residence, date of death, cause of death and place where death was certified). In this study we used death registries and discard the use of death certificates for major missing and deficiencies. The total number of deaths (all causes of death) for the three years 1989, 1997 and 2005 were obtained, together with available data on each and every case for which cancer was written as the cause of death were compiled. .

Despite all efforts made to obtain as accurate data as possible on cases, deaths and denominator population, we can not claim perfectionism at all. Some margins of error do exist. Some cases are not compiled in our data base, fewer deaths are also likely to have been missed and the exact number of population is not totally ascertained. Nevertheless, we are confident that the figures reported in this report are the best epidemiological estimations at this stage of work.

For the purpose of geographical distribution, the system used by the health authorities in which Basrah governorate is divided into Health Sectors, which with specified services and populations. The geographical areas (Administrative areas) are: Basrah city, Northern Area (Qurna, Mdaina and Hartha), Western Area (Zubair district inclusive of Safwan and Um-Qasr), Southern Area (Abul-Khasib and Fao districts) and Eastern Area (Shatt AL-Arab district).

4.2. Cancer incidence in Basrah 2005

Incidence and incidence rates are useful epidemiological parameters to estimate the risk of acquiring cancer for the whole population and for subsets of it. This parameter is influenced by variation in exposure to various risk factors and aetiological agents in the surrounding environment, host factors and the nature and carcinogenicity of the causes. The estimation of the incidence rate is also affected by the completeness and accuracy of case detection and recording as well as by the accuracy of population (denominator) estimation. The results reported in the following sections are by no means immune against all these potential sources of error. They represent, in the viewpoint of the authors, ***the best available epidemiological estimates for the year 2005*.** They are inclusive of cases diagnosed in 2005 and validated up to the end of September 2006. The numbers are moving numbers. They are amenable to change in the future if more cases are identified and verified as cases which belong to the year 2005.

Distribution of new cases by sex and type of cancer

Table 4.1 shows the distribution of new cancer cases reported in Basrah governorate during 2005 classified according to sex and type of cancer. Over all, 45.7% are male cases and 54.3% are female cases. The five leading cancers are

those of breast (17.6%), urinary bladder (6.7%), Lymphomas (Hodkins and Non-Hodkins: 6.4%). Skin (6.1%) and lung (5.5%). The five leading cancers in males and females are different. For males these are urinary bladder (10.8%), lymphomas (9.7%), lung (8.7%), skin (7.4%) and larynx (6.5%). For females, breast cancer form just under one third of all cancers in women (31.7%), followed by cancers of uterus &cervix (5.5%), skin (5.1%), ovary (4.9%) and colon-rectum (4.2%). Among the major cancers which are relatively more among males are cancer of the urinary bladder, lymphomas, Skin, lung, larynx, leukemia, pharynx and soft tissue. Cancers which are relatively more common among females are those of the breast and thyroid gland.

Annual cancer specific incidence rates

Table 4.2 summarizes the annual incidence rates of different cancers in Basrah governorate. For all cancers together, the annual incidence rate is 74.3/100 000. Breast cancer shows the highest annual incidence rate in Basrah in 2005 (13.1/100 000). Other important cancer are those of urinary bladder (5.0/100 000), Lymphomas both Hodgkin's and Non-Hodgkin's (4.8/100 000), skin (4.5/100 000) and lung (4.1/100 000). Less frequent are leukemia (3.2/100 000), cancer of colon-rectum (3.2/100 000) cancer of larynx (3.1/100 000), cancer of stomach (2.8/100 000) and soft tissue tumours (2.7/100 000). These ten leading cancer account for about 46.5/100 000 or 62.6% of the over all risk of cancer in Basrah in 2005.

Table 4.1: Distribution of new cancer cases in Basrah 2005 by type of cancer and sex

Type of cancer	Males		Females		Total	
	No.	%	No.	%	No.	%
Breast	6	0.8	276	31.7	282	17.6
Urinary bladder	79	10.8	28	3.2	107	6.7
Lymphomas	71	9.7	32	3.7	103	6.4
Skin	54	7.4	44	5.1	98	6.1
Lung	64	8.7	24	2.8	88	5.5
Leukaemia	36	4.9	32	3.7	68	4.2
Colon-rectum	31	4.2	37	4.2	68	4.2
Larynx	48	6.5	18	2.1	66	4.1
Stomach	31	4.2	29	3.3	60	3.7
Soft tissue	39	5.3	19	2.2	58	3.6
Other lymphoid cancer	28	3.8	21	2.4	49	3.1
Uterus &cervix	-	0.0	48	5.5	48	3.0
Bone	24	3.3	22	2.5	46	2.9
Ovary	-	0.0	43	4.9	43	2.7
Pleura	18	2.5	15	1.7	33	2.1
CNS	17	2.3	13	1.5	30	1.9
Peritoneum	11	1.5	18	2.1	29	1.8
Thyroid gland	6	0.8	23	2.6	29	1.8

Pharynx	21	2.9	6	0.7	27	1.7
Liver	13	1.8	11	1.3	24	1.5
Kidney	11	1.5	13	1.5	24	1.5
Prostate	21	2.9	-	0.0	21	1.3
Pancreas	8	1.1	12	1.4	20	1.2
Secondary	12	1.6	6	0.7	18	1.1
Parotid gland	7	1.0	6	0.7	13	0.8
Testis	11	1.5	-	0.0	11	0.7
Bone marrow	7	1.0	3	0.3	10	0.6
Retroperitoneal	4	0.5	6	0.7	10	0.6
Choriocarcinoma	-	0.0	10	1.1	10	0.6
Nose	6	0.8	3	0.3	9	0.6
Oral cavity	3	0.4	6	0.7	9	0.6
Gall bladder	4	0.5	4	0.5	8	0.5
Intestine	6	0.8	1	0.1	7	0.4
Abdomen	2	0.3	3	0.3	5	0.3
Vulva/vagina	-	0.0	5	0.6	5	0.3
All others	35	4.8	34	3.9	69	4.9
Total	733	100.0	871	100.0	1604	100.0
Out of grand total	45.7		54.3		100.0	

Table 4.2: Reported cases of cancer (all types) in Basrah governorate in 2005: Incidence rates per 100 000 by type of cancer

Type of cancer	No. of cases	Percentages	Incidence rate per 100 000
Breast	282	17.6	13.1
Urinary bladder	107	6.7	5.0
Lymphomas	103	6.4	4.8
Skin	98	6.1	4.5
Lung	88	5.5	4.1
Leukemia	68	4.2	3.2
Colon-rectum	68	4.2	3.2
Larynx	66	4.1	3.1
Stomach	60	3.7	2.8
Soft tissue	58	3.6	2.7
Other lymphoid cancer	49	3.1	2.3
Uterus &cervix	48	3.0	2.2
Bone	46	2.9	2.1
Ovary	43	2.7	2.0
Pleura	33	2.1	1.5
CNS	30	1.9	1.4
Peritoneum	29	1.8	1.3
Thyroid gland	29	1.8	1.3
Pharynx	27	1.7	1.3

Liver	**24**	**1.5**	**1.1**
Kidney	**24**	**1.5**	**1.1**
Prostate	**21**	**1.3**	**1.0**
Pancreas	**20**	**1.2**	**0.9**
Secondary	**18**	**1.1**	**0.8**
Parotid gland	**13**	**0.8**	**0.6**
Testis	**11**	**0.7**	**0.5**
Bone marrow	**10**	**0.6**	**0.5**
Retroperitoneal	**10**	**0.6**	**0.5**
Choriocarcinoma	**10**	**0.6**	**0.5**
Nose	**9**	**0.6**	**0.4**
Oral cavity	**9**	**0.6**	**0.4**
Gall bladder	**8**	**0.5**	**0.4**
Intestine	**7**	**0.4**	**0.3**
Abdomen	**5**	**0.3**	**0.2**
Vulva/Vagina	**5**	**0.3**	**0.2**
All others	**69**	**4.9**	**3.2**
Total	**1604**	**100.0**	**74.3 (SIR=117.7)**

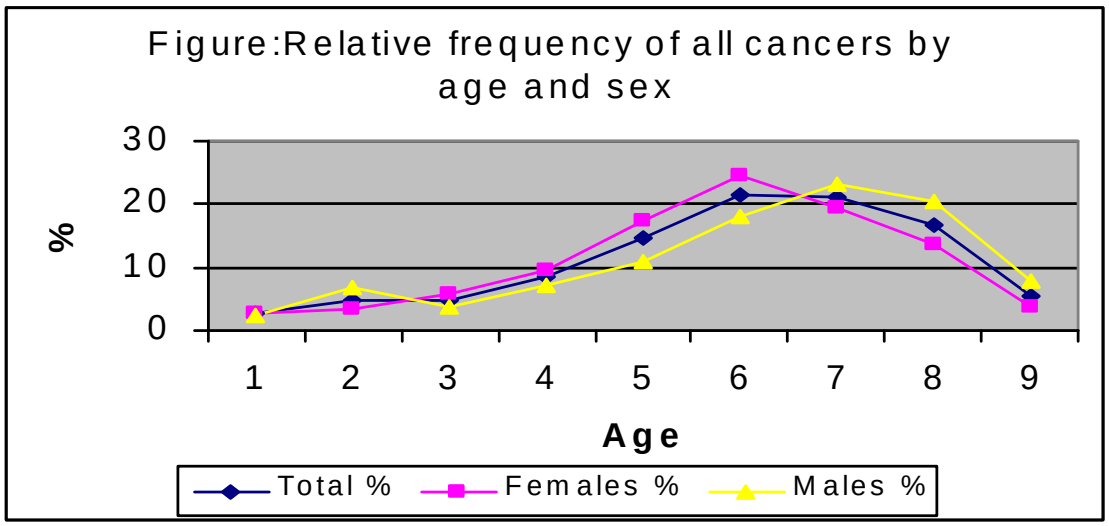
Distribution of cancer by age and sex

A comparison of the relative frequency of cancer for age and sex for the year 2005 is shown in **Table 4.3.** The over all distribution for males and females is similar. The relative frequency is lower in children and young adults and high for older people. Up to the age of 34 years, the relative share of cases is generally low and exhibit similar pattern for males and females. In children aged <15 years, the percentage in males is higher (9.2%) than in females (6.1%). In the age groups 15-54, the percentages are higher for females than for males. In older people (55 years and above) the percentages are higher for males. The relative predominance of females in young and middle aged adults reflects the high incidence of breast cancer among females in this time of life.

Table 4.3: Age and sex distribution of cases of cancer (all types) reported in Basrah in 2005

Age	Males		Females		Total	
	No.	%	No.	%	No	%
<5	18	2.5	24	2.8	42	2.6
5-14	49	6.7	29	3.3	78	4.9
15-24	28	3.8	50	5.7	78	4.9

25-34	51	7.0	84	9.7	135	8.4
35-44	80	10.9	152	17.5	232	14.5
45-54	131	17.9	214	24.6	345	21.5
55-64	170	23.2	169	19.4	339	21.1
65-74	149	20.3	118	13.6	267	16.6
75 & above	57	7.8	31	3.6	88	5.5
Total	733	100.0	871	100.0	1604	100.0



This figure is based on data in Table 4.3
Age: 1=<5, 2=5-14, 3=15-24, 4=25-34, 5=35-44, 6-45-54, 7=55-64, 8=65-74, 9=75 and above

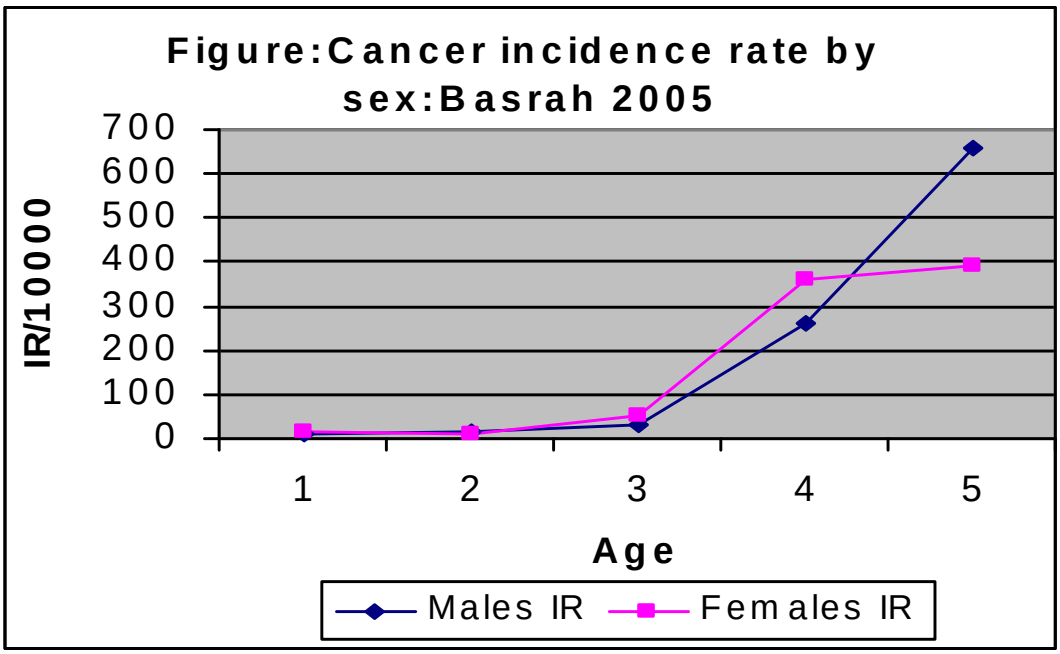
Age and sex specific Incidence rates of cancer

Table 4.4 shows the age and sex specific annual incidence rates of all cancers reported in Basrah in 2005 for different age groups in males and females. In children aged <5 years, the annual incidence rate is 13/100 000 for males and 17.6/100 000 for females. In older children (5-14 years), the annual incidence rate is 17.2 and 10.5/100 000 for males and females respectively. In adults, the annual incidence rate increases sharply with increasing age. Among males, it is 31.4 for those aged 15-44, 261.5 for those aged 45-64 and 660.2 for the elderly aged 65 years and above. The corresponding figures for females in the same age groups are 54.5, 361.1 and 390.7 per 100 000 in that order. Again the higher rates among females in the age range 15-64 reflects the high risk of breast cancer in this time of life. The over all incidence rate is 68.1/100 000 for males and 80.5/100 000 for females.

Table 4.4: Population of Basrah by sex and age, total cancer cases by sex and age and annual incidence rates for the year 2005

Age (yrs)	Males			Females		
	Population	Cases	IR	Population	Cases	IR
<5	138790	18	13.0	136354	24	17.6
5-14	285112	49	17.2	277037	29	10.5
15-44	505670	159	31.4	524855	286	54.5
45-64	115121	301	261.5	106054	383	361.1
65&over	31201	206	660.2	37876	148	390.7
Total	**1 075 894**	**733**	**68.1**	**1 082 176**	**871**	**80.5**

Over all Standardized incidence rate using World Standard Population = 117.7/100 000



This figure is based on data in Table 4.4
Age: 1= <5, 2=5-14, 3=15-44, 4=45-64, 5=65 and above

Geographical (Spatial) distribution

Table 4.5 Shows the estimated annual incidence rates of all cancers for different geographical areas in Basrah governorate in 2005. The highest incidence rate is recorded in Western area (Zubair district: 80.0 per 100 000) followed by Basrah city with a rate of 78.4 per 100 000, Eastern area (Shatt-Al-Arab district: 76.3 per 100 000), Southern area (Abul-Khasib district: 72.3 per 100 000) and the lowest rate (65.3 per 100 000) is recorded in the Northern Area (Hartha, Qurna and Mdainah).

Table 4.5: Annual incidence rates (per 100000) of all cancers in different areas of Basrah in 2005

Area	Population	Registered cases	IR/100 000
Basrah City	**853484**	**669**	**78.4**
Northern Area	**609654**	**398**	**65.3**
Western Area	**401481**	**321**	**80.0**
Southern Area	**195128**	**141**	**72.3**
Eastern Area	**98323**	**75**	**76.3**
Total	**2158070**	**1604**	**74.3 (SIR= 117.7)**

4.3. Cancer mortality in Basrah 2005

Mortality data are generally considered more accurate than incidence data particularly in countries where official burial of the deceased requires legal endorsement of death with specification of the cause of death. This is true in Iraq. No dead person can be buried without official death certificate. Exceptions may involve very few newly borne babies who may be buried without having official birth and death certificates. These cases are likely to have very little effect on the validity of mortality data related to cancer.

Type of cancer as a cause of death for 2005

Table 4.6 shows the frequency, relative frequency and the cause specific annual mortality rates of cancer in Basrah governorate during the year 2005. Six groups (cancers of lung, breast, urinary bladder, blood, lymphomas and CNS) account for more than half of cancer related deaths (56.6%). Other significant Contributors to cancer mortality are cancers of colon-rectum (4.3%), Liver (4.2%), Stomach (3.7%), Bone (3.4%) and larynx (3.4%). All other cancers Have lesser share in cancer relative contribution to mortality. Regarding the annual mortality rate, the same order is seen. The cancer specific mortality rates are generally lower than those reported in western countries and most of developing countries. Some cancers (urinary bladder and lymphomas) show close mortality rates to those in developing countries (See Tables 1.3 and 4.6)

Age and sex composition of cancer deaths in 2005

To compare the risk of death from cancer (All cancers together) between males and females and for different age groups, age and sex specific death rates are calculated and presented in **Table 4.7**. In general, age specific death rates are low in children under 15 years of age and young adults aged 15-44 years with little differences between male and female children. Young adult females aged 15-44 show some excess in the death rate (14.1/100 000) as compared to young adult males of the same age range (8.9/100 000). Similar pattern is noticed in people aged 45-64 years with a death rate of 116.9/100 000 among females compared to 103.4 /100 000 among males. Massive difference is observed between males and

females in the age group 65 years and above. The death rate among males is 439.0/100 000 compared to 285.1/100 000 among females. The excess among women aged 15-64 may reflect the effect of breast cancer which is a leading cause of death among women in this range of age. The decrease among female s in the elderly age group is likely to reflect exhaustion of susceptible women and increased risk of certain fatal cancers among elderly males.

Table 4.6: Relative frequency and annual mortality rates (All cancers) in Basrah in 2005

Type of cancer	No. of deaths	Percentages	Death rate per 100 000
Lung & Bronchus	93	14.3	4.3
Breast	70	10.8	3.2
Urinary Bladder	60	9.2	2.8
Blood	59	9.1	2.7
Lymphomas*	45	6.9	2.1
CNS	42	6.5	1.9
Colon-rectum	28	4.3	1.3
Liver	27	4.2	1.3
Pancreas	26	4.0	1.2
Stomach	24	3.7	1.1
Bone	22	3.4	1.0
Larynx	22	3.4	1.0
Uterus	18	2.8	0.8
Secondary	14	2.0	0.6
Kidney	12	1.8	0.6
Prostate	12	1.8	0.6
Ovary	11	1.7	0.5
Skin	10	1.5	0.5
Oesophagus	9	1.4	0.4
Intestine	6	0.9	0.3
Gall bladder	5	0.8	0.2
Oral cavity	5	0.8	0.2
Nose	3	0.5	0.1
Pharynx	3	0.5	0.1
Thyroid	2	0.3	0.1
Abdomen	2	0.3	0.1
Penis	2	0.3	0.1
All other cancers	17	2.6	0.8
Total	649	100.0	30.1 (SMR=52.2)

*** This may include few secondary lymphoretic s**

Table 4.7: Age and sex specific mortality rates (per 100 000): All cancers, Basrah 2005

Age (yrs)	Males Population	Deaths	Rates	Females Population	Deaths	Rates
< 1	31201	2	6.4	30301	2	6.6
1-4	107589	4	3.7	106053	5	4.7
5-14	285112	18	6.3	277037	11	4.0
15-44	505670	45	8.9	524855	74	14.1
45-64	115121	119	103.4	106054	124	116.9
65&over	31201	137	439.0	37876	108	285.1
Total	1 075 894	325	30.2	1 082 176	324	29.9

Over all standardized mortality rate using World Standard Population = 52.2

Geographical (Spatial) distribution of cancer deaths in 2005

Table 4.8 shows the population, annual number of deaths and mortality rates per 100 000 in each of the main areas in Basrah governorate. The highest mortality rate (46.8) is recorded for the eastern area (Shatt-Al-Arab district) followed by that for Basrah city (38.1), Western area (Zubair district) with a figure of 27.1 and Northern area with a rate of 22.1. The lowest rate for the southern area (17.4). This spatial variation is rather difficult to explain. Differential exposure to environmental risk factors can not be verified at this stage. Also, a margin of error in both numerators and denominators is expected.

Table 4.8: Annual mortality rates (per 100 000) of all cancers in different areas of Basrah in 2005

Area	Population	Annual deaths	Death rate per 100 000
Basrah City	853484	325	38.1
Northern Area	609654	135	22.1
Western Area	401481	109	27.1
Southern Area	195128	34	17.4
Eastern Area	98323	46	46.8

Total	**2158070**	**649**	**30.1 (SMR=52.2)**

4.4. Time trends in incidence and mortality

Trends in incidence rates of cancer

To give crude estimates of the trend in cancer incidence rates in Basrah, we used the data which were collected by the cancer registration section for the years 1990, 1997, 1999 and 2005 as mentioned in section **4.1** of this report. This section collects data on solid tumours only) **Table 4.9** shows that the annual incidence rate of solid tumours is more or less stable except a clear rise in 2005. These results are very crude and can not be considered as representative of the real situation in Basrah. They suggest some degree of rise in the risk of cancer with time.

The rise in the incidence of cancer is clear, however, when a comparison is made between cancer specific incidence rates for ten leading cancers for the years 1995 and 2005 in **Table 4.10** (These two years were selected because of availability of data on these ten cancers). It is very clear that the annual incidence rates for the ten selected cancers are consistently higher in 2005 as compared to 1995. The percentages of rise in the incidence rates range from 39.1% in case of leukemia to 227.1% in case of breast cancer. The change rise in the over all incidence rate and in the incidence rates of selected cancers could reflect artificial rise due to improved diagnosis, improved notification and recording of cases but part of this rise is expected to reflect a real increase in the risk of cancer in Basrah .

Table 4.9: Total population, cancer cases (solid tumours) registered in the Cancer Registration Section and estimates of annual incidence rates of all solid cancers for selected years in Basrah governorate

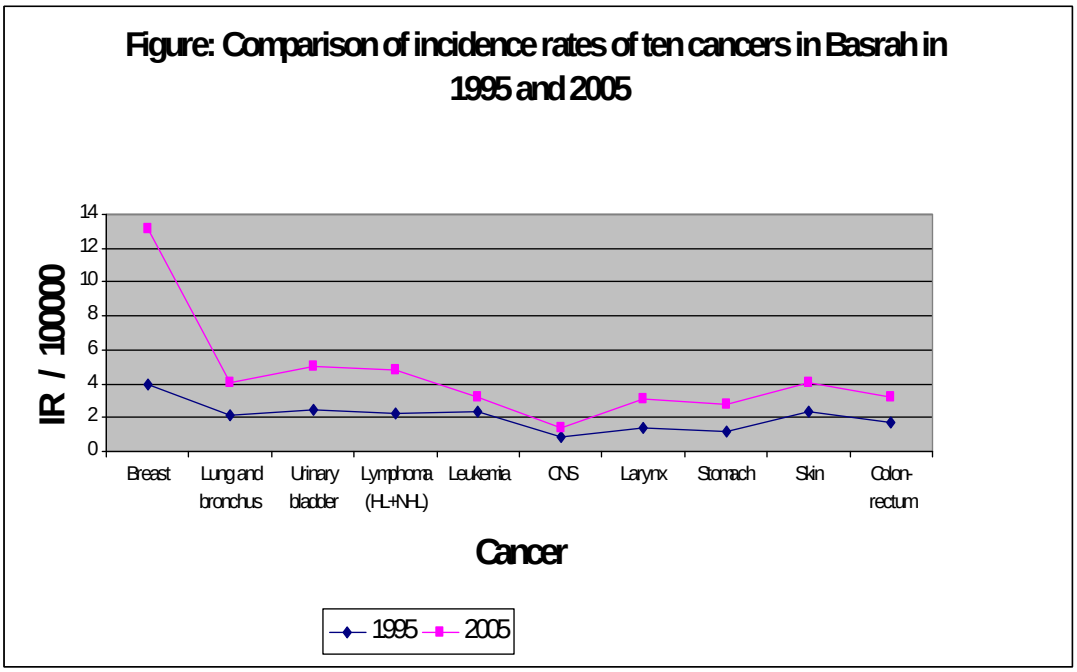
Variable	1990	1997	1999	2005
Total population	1092230	1556445	1655984	2158070
Total Registered cases	488	544	688	1327
Incidence rate per 100 000	44.7	35.0	41.5	61.5

Table 4.10: Incidence rates/100 000 of selected cancers for selected years in Basrah governorate

Cancers	Years*		% change
	1995	2005	
Breast	4.0	13.1	+ 227.5
Lung and bronchus	2.1	4.1	+ 95.2

Urinary bladder	**2.5**	**5.0**	**+ 100.0**
Lymphoma (HL+NHL)	**2.2**	**4.8**	**+ 118.2**
Leukemia	**2.3**	**3.2**	**+ 39.1**
CNS	**0.9**	**1.4**	**+ 55.6**
Larynx	**1.4**	**3.1**	**+ 121.4**
Stomach	**1.2****	**2.8**	**+ 133.3**
Skin	**2.4****	**4.1**	**+ 70.8**
Colon-rectum	**1.7 ****	**3.2**	**+ 88.2**

*** Figures for 1995 were obtained from Ref. 14**
**** For 1997**



This figure is based on data in Table 4.10

Trends in mortality from cancer for the years 1989, 1997 and 2005

Mortality data are generally considered more accurate than morbidity data but also suffer some limitations.[15-16]. In Iraq, official and medically endorsed death certificate is always required for the burial of any deceased person regardless of age, sex or cause of death. The death certificate includes an essential field for writing down the cause(s) of death. Accuracy of causes of death is likely to be affected in extreme ages. Cancer as cause of death is not immune against errors

but the error is expected to be small given the fact that cancer is an important health problem among even lay people. Examination of time trends of cancer specific death rates could be considered a good indicator of the burden of cancer in population especially in places where cancer treatment does not experience dramatic change.

Crude death rate, cancer death rate and cancer proportional death rate For the years 1989, 1997 and 2005

Table 4.11 shows the crude death rates, cancer specific death rates and the cancer proportional mortality ratios over the years 1989, 1997 and 2005.

The crude death rates for 1997 and 2005 are similar but much lower than that for 1989. This looks opposite to the expectation. We have no clear cut explanation. One possible explanation for the high crude death rate in 1989 is that the rise is artificial due to registration of newly identified dead military people from the remnants of the Iraq-Iran War. Cancer specific death rates suggest some rise from 29.2 /100 000 in 1989 to 33.3/100 000 in 1997 and 32.3 /10 0000 in 2005. The same is true for the cancer proportional mortality ratio which showed clear increase with time. The latter two types of rates may suggest some degree of increase in risk of death in Basrah with the passage of time.

Table 4.11: Time trend of crude death rates and cancer specific death rates, cancer proportional mortality ratios in Basrah for the years 1989, 1997 and 2005

Years	Population	Total deaths	CRD	Cancer deaths	CSDR	PMR(%)
١٩٨٩	١٠١٨٠٧٣	٩٧٠٥	٩,٥	٢٩٧	٢٩,٢	٣,١
١٩٩٧	1499 628	٧٨٥٢	٥,٢	٤٩٩	٣٣,٣	٦,٤
٢٠٠٥	٢١٥٨٠٧٠	١٠٠٢١	٤,٦	649	٣٢,٣	٦,٥

CDR=Crude death rate per 1000, CSDR=Cancer specific death rate per 100 000
PMR=Proportional mortality ratio

Sex distribution of cancer deaths for the years 1989, 1997 and 2005

Table 4.12 shows the relative composition of cancer deaths with respect to sex for the three years 1989, 1997 and 2005. Deaths among males form 56.2%, 57.3% and 50.1% in the three years in that order. The corresponding figures for females are 43.8%, 42.7% and 49.9%. The over all distribution exhibited a significant statistical difference ($P<0.05$). The main difference in sex composition of deaths is in some rise in female share in 2005. This rise is very likely to reflect the rising incidence and mortality of breast cancer in females.

Table 4.12: Comparison of cancer deaths by sex and years

Sex	1989		1997		2005		Total	
	No.	%	No.	%	No.	%	No.	%
Males	167	56.2	286	57.3	325	50.1	778	53.8
Females	130	43.8	213	42.7	324	49.9	667	46.2
Total	297	100.0	499	100.0	649	100.0	1445	100.0

X2 = 6.8 2df P<0.05

Mean age of cancer deaths by sex and year

Table 4.13 shows that the mean age of all cancer deaths among males is 56.98 years which significantly higher than the mean age of cancer deat hs among females (53.35 years). P<0.05. The mean age does not exhibit significant change with time. The figures for the three years are very close (P>0.05) despite a minor tendency towards a decline.

Table 4.13: Mean age of patients dying from cancer by s ex and years

Variable	Number of deaths	Mean age +SD	P value
1.Sex			
Males	**778**	**56.98 + 19.75**	**<0.05**
Females	**667**	**53.35 + 19.99**	
2. Years			
1989	**297**	**55.58 + 17.53**	
1997	**499**	**55.32 + 20.79**	
2005	**649**	**55.18 + 20.33**	**>0.05**

Spatial distribution of cancer deaths for the years 1989, 1997 and 2005

Table 4.14: compares the relative frequency of deaths in different areas of Basrah governorate for three years (1989, 1997 and 2005)**.** The hypothesis beyond the choice of these three years has al ready been stated before (Section 5.1).The over all patterns in the three years are generally similar for the three years with few exceptions. The variation can not be interpreted without further

analysis taking into consideration a possible differential changes in the population size in each area.

Table 4.14: Comparison of cancer deaths by areas of Basrah and years

Area	1989		1997		2005	
	No.	%	No.	%	No.	%
Basrah City	159	53.5	279	55.9	325	50.1
Northern Area	58	19.5	94	18.8	135	20.8
Western Area	53	17.8	73	14.6	109	16.8
Southern Area	14	4.7	37	7.4	34	5.2
Eastern Area	13	4.4	16	3.2	46	7.1
Total	297	100.0	499	100.0	649	100.0

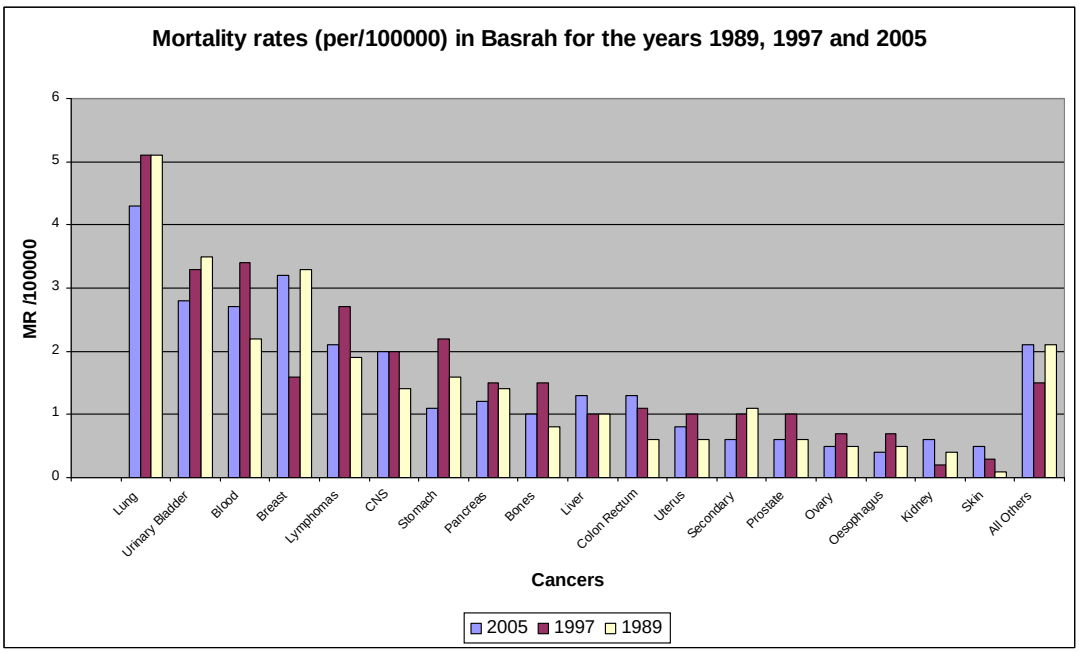
X2 = 15.6 8df P < 0.05

Mortality rates for the years 1989, 1997 and 2005

Table 4.15 shows the annual cancer specific mortality rates in Basrah governorate for the years 1989, 1997 and 2005. No clear pattern can be identified. The risk of death is not much different in different years. Most cancers show stable or slightly fluctuating level of risk of death with time. Slight rise in the risk of death may be noticed in cancers of CNS, blood (leukemia), Bones, lymphomas and Colon-rectu

Table 4.15: Comparison of annual mortality rates /100 000 of various cancer deaths in Basrah for the years 1989, 1997 and 2005

Type of cancer	1989	1997	2005
Lung	5.1	5.1	4.3
Urinary Bladder	3.5	3.3	2.8
Blood	2.2	3.4	2.7
Breast	3.3	1.6	3.2
Lymphomas	1.9	2.7	2.1
CNS	1.4	2.0	2.0
Stomach	1.6	2.2	1.1
Pancreas	1.4	1.5	1.2
Bones	0.8	1.5	1.0
Liver	1.0	1.0	1.3
Colon Rectum	0.6	1.1	1.3
Uterus	0.6	1.0	0.8
Secondary	1.1	1.0	0.6
Prostate	0.6	1.0	0.6
Ovary	0.5	0.7	0.5
Oesophagus	0.5	0.7	0.4
Kidney	0.4	0.2	0.6
Skin	0.1	0.3	0.5
All Others	2.1	1.5	2.1
Total	29.2	33.3	٣٢,٣



This figure is based on data in Table 4.15

4.5. Survival rates for 2005 in different areas of Basrah governorate

One of the difficult epidemiological parameters to calculate and interpret is the survival rate given the doubts surrounding the completeness of case registration and accuracy the registered cause of death at the death certificates. Survival rates are affected by these possible errors as well as the availability of effective treatment and the nature of the cancer itself. According to Parkin 2002 (**7**), it is possible to estimate the five- year survival rates by the following formula:

$$\text{Five-year survival} = \left(1 - \frac{\text{Mortality rate}}{\text{Incidence rate}}\right)$$

We used this method to estimate the five year survival rates as shown in **Tables 4.16-4.19**

Survival for different types of cancer

Table 4.16 shows the estimated annual incidence rates, the annual mortality rates and survival rates for different cancers. The range of the survival rates is from 0% in case of cancers of the lung, liver, pancreas and intestine(other than the colon-rectum) to as high as 80% and above in case of cancers of skin, thyroid , pharynx, male genital organs. Apart of completeness of data, the case fatality and hence the survival rate is affected by stage at which cancer is diagnosed, the nature and aggressiveness of the cancer itself and the availability of effective medical care.

Survival by age and sex

Table 4.17 shows that the survival rate is better for females (62.9%) as compared to males (55.7%). This favourable survival in females is likely to reflect th e effect of breast cancer which is the prime cancer among females and known to have high survival rate.

Regarding age (**Table 4.18)**, Survival rate is higher early in life and decreases with advancing age . In males the survival rate for children aged <15 is 63.9% . It is higher (71.7%) for people aged 15-45 years then declines to reach as low as 33.5 for males aged 65 years and above. Similar pattern is noticed for females except that the trend of decreasing survival with advancing age is smoother.

Table 4.16: Annual incidence rate, annual mortality rate and five years survival rates for all cancers by type of cancer

Type of cancer	Annual incidence rate	Annual mortality rate	Survival rate (%)
Breast	13.1	3.2	75.6
Urinary bladder	5.0	2.8	44.0
Lymphomas	4.8	2.1	56.3
Skin	4.5	0.5	88.9
Lung	4.1	4.3	0.0
Leukemia	3.2	2.7	15.6
Colon-rectum	3.2	1.3	59.4
Larynx	3.1	1.0	67.7
Stomach	2.8	1.1	60.7
Soft tissue	2.7	NA	NA
Other lymphoid cancer	2.3	NA	NA
Uterus &cervix	2.2	0.8	63.6
Bone	2.1	1.0	52.4
Ovary	2.0	0.5	75.0
Pleura	1.5	0.1	33.3
CNS	1.4	1.9	0.0
Peritoneum	1.3	NA	NA
Thyroid gland	1.3	0.1	92.3
Pharynx	1.3	0.1	92.3
Liver	1.1	1.3	0.0
Kidney	1.1	0.6	45.5
Prostate	1.0	0.6	40.0
Pancreas	0.9	1.2	0.0
Secondary	0.8	0.6	25.0
Parotid gland	0.6	NA	NA
Testis/Penis	0.5	0.1	80.0
Bone marrow	0.5	NA	NA
Retroperitoneal	0.5	NA	NA
Choriocarcinoma	0.5	NA	NA
Nose	0.4	0.1	75.0
Oral cavity	0.4	0.2	50.0
Gall bladder	0.4	0.2	50.0
Intestine	0.3	0.3	0.0
Abdomen	0.2	0.1	50.0
Vulva/Vagina	0.2	NA	NA
All others	3.2	0.8	75.0
Total	74.3	30.0	59.6

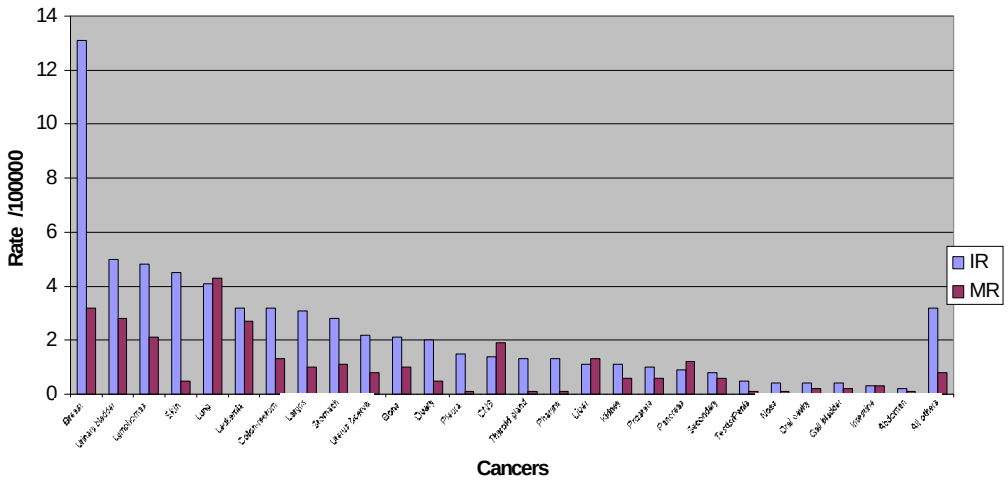


Figure :Incidence and mortality rates (per 100000) of different cancers in Basrah 2005

This figure is based on data in Table 4.16

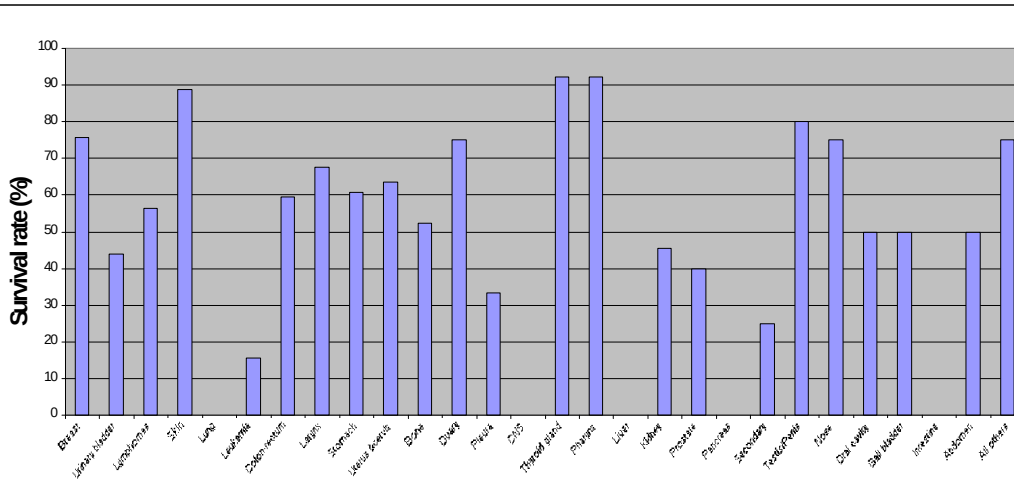


Figure: Survival rate (%) for cancers in Basrah 2005

This figure is based on data in Table 4.16

Table 4.17: Annual incidence rate, annual mortality rate and five years survival rates for all cancers by sex

Sex	Annual incidence rate/100 000	Annual mortality rate	Five year-survival rate (%)
Males	68.1	30.2	55.7
Females	80.5	29.9	62.9
Total	74.3	30.0	59.6

Table 4.18: Annual incidence rate, annual mortality rate and five years survival rates for all cancers by age and sex

Age	Males			Females		
	IR/100 000	MR/100 000	Survival rate (%)	IR/100 000	MR/100 000	Survival rate (%)
<15	15.8	5.7	63.9	12.8	4.4	65.6
15-44	31.4	8.9	71.7	54.5	26.7	51.0
45-64	261.2	103.4	60.4	357.4	236.3	33.9
65& above	660.2	439.1	33.5	390.7	285.1	27.0
Total	68.1	30.2	55.7	80.5	29.9	59.6

Survival by geographical area

With respect to geographical areas of Basrah governorate. Great variation is seen in the five year survival rates (**Table 4.19**). The range is from 38.7% for the eastern district to as high as 75.9% in the southern districts. This variation may reflect variation in completeness of case registration, nature of cancer distribution or differential care available for cases, accessibility to treatment may be different.

Table 4.19: Survival rates for 2005 in different areas of Basrah governorate

Area	Annual Incidence rate	Annual death rate	Survival rate(%)
Basrah city	78.4	38.1	51.4
Northern area	65.3	22.1	66.2
Western area	80.0	27.1	66.1
Southern area	72.3	17.4	75.9
Eastern area	76.3	46.8	38.7
Total	74.3	30.0	59.6

4.6. Summary conclusions

1. Cancer is a real health problem in Basrah in terms of incidence and mortality.

2. The need for and the creation of a sustainable cancer registry at the level of Basrah governorate is crucial for the planning, management and evaluation of epidemiological changes as well as provision of effective preventive and therapeutic care.. Without such reliable registry, all measures to deal with cancer are unlikely to be completely successful

3. A team approach is inevitable for the success of any work which deems fruitful to handle the public and individual needs and consequences of cancer.
We initiated this, but the continuity depends on others in the clinical , laboratory, administrative and statistical domains of the game.

4. Although, the data base on cancer cases is still incomplete , preliminary results do provide clues to the rising trend in cancer incidence in Basrah. Regarding mortality, the picture is confusing. A rise in incidence and leveling in morta lity could reflect improvement in treatment of cancer . No doubt that the surgical handling, the chemotherapy as well as other aspects of care are better in Basrah during the past decade than they were two or more decades ago . Early diagnosis is a definite contributor to the better outcome of cancer in terms of longer survival.

5. Further analysis at individual cancer level is required but that is relevant only after good data base is created for several years. Aggregate analysis could cancel some time changes in incidence and/or mortality if some cancers counteract the effect of others.

6. The sustainability of the current project towards a final destiny of comprehensive cancer registry and effective system of cancer care requires substantial support from local authorities, local NGOs and international organizations.

5. FUTURE PERSEPECTIVES

For the "**FOUR-LEGGED PROJECT**" to move forward, we definitely need:

1. Continuation of efforts to improve routine cancer registration. This needs a number of practical steps:

a. Creation of administrative and scientific back up bodies. The working paper presented at the seminar on May 28th, 2006, proposed a framework for the creation of local cancer council which is entitled to supervise all cancer related activities in Basrah. In the meanwhile, the council is part of a national network encompassing local councils in other governorates and national cancer council. It is envisaged that the creation of such body or bodies will enhance coordinated, scientific and effective measures to deal with the problems of environment and cancer.

2. The initiation of complementary population-based (household based) studies to validate the cancer registry data base. The questionnaire (**Appendix 4**) may be further developed to be used in the population-based surveys.

3. Further improvement in analytical epidemiological studies. These studies are the basis for hypotheses testing about any proposed risk factors and environmental exposures.

These last two areas of activities (i.e., the household based survey and the wide scale analytical studies) requires substantial support in terms of financial, technical and administrative. The security issue remains one of the main obstacles to any sustainable work in this field. The success of all proposed activities is also dependent on the successful "cultivation" of team work and the recognition by all partners of the value of multidisciplinary approach to problem solving. Without these prerequisites, nothing significant is expected to be achieved.

4. The future of any scientific work like the one concerns cancer in Basrah depends entirely on the will and commitment of doctors to work together towards caring for the people, their ability to realize the value of numbers in medical practice and research and their perception that in some time in the future they will be audited for their performance. Without this, nothing radical will happen in the way we are handling health care of the people.

Regardless, three envisaged hopes can be mentioned here

a. A conference on Environment and cancer is planned to be held in November 2006. This depends however on security situation and the support of local and international interested partners.

b. A consensus is reached on Basrah population-based cancer Registry

c. A household survey is essential complementary activity to consolidate and validate the data base on cancer in Basrah. The survey could be based on periodical (every five years) sample household survey.

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