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地方病与环境图集

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Endemic Diseases and Their Environments
in the People's Republic of China

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前　言

（一）

我国幅员辽阔，生态环境复杂，即多样的地形、气候、土壤和生物群落在我国的领土之内有机地结合成外观和性质各不相同的生态景观。中华民族自古以来就劳动、生息、繁衍于这块辽阔的土地之上，生活于各种生态环境之中。他们并从中获得自己生长、发育、繁衍所需要的能量和物质，当然也包括了各种生命必需元素。由于人作为自然历史发展的产物，也不可避免地要与生态环境（景观）之间进行能量和物质的交换和循环。一般来说，人应该与其所处生态环境处于相适应的协调之中，但有时由于生态环境的异常或人们自身的特殊生活习惯，使人体与生态环境之间的平衡达不到所需的水平而影响健康，以致罹患地方病。因此，我国复杂多样的生态环境，以及人们的生产活动和生活习惯的各不相同，使之有多种地方病的分布。

在我国党和政府的领导下，有关部门进行了长期的地方病调查和防治科研工作，积累了世界各国所少有的宝贵科学资料。但这些十分宝贵的资料却分散在不同地区、不同部门和不同单位。为了更有效地控制和消灭地方病，需要全面认识我国地方病的地理分布规律、流行特点及其与生态环境，特别是化学生态环境的关系。因此，综合性地、系统地分析我国已经积累的宝贵资料已显得十分必要。本《图集》的编制就是为达到这一目的。它着重展现由于环境化学因子所致的、或虽然病因尚未完全明确但又显然与环境化学因子有关的，并且影响较大、范围较广的几种地方病的分布、流行特点及其与环境因素的关系，包括：克山病、大骨节病、地方性甲状腺肿（包括地方性克汀病）和地方性氟中毒。

本《图集》将有助于各有关主管部门制订全面防治地方病规划，因地制宜分别轻重缓急地部署防治力量；为经济建设和国防建设提供有价值的参考资料；为深入研究病因提供科学依据；还能为普及地方病知识和医学教育提供形象的教材；同时也希望进一步推动医学、地学、化学和生物学在地方病研究领域的合作，加强我国医学地理制图在国际交流中的地位。

（二）

鉴于上述目的，1980年提出了编制我国地方病图集的任务。经过充分筹备后，在中共中央地方病防治领导小组办公室和中国科学院环境科学委员会的共同主持下，于1981年8月初召开了《中华人民共和国地方病与环境图集》编纂委员会第一次会议，明确了任务。编纂委员会（以下简称编委会）负责《图集》的设计思想、科学内容、表现方法等问题的审定，编委会下设编辑组和资料组。编辑组由中国科学院有关研究所和医学院校的有关专业人员组成，负责《图集》总体设计、资料处理、原图约稿、科学内容审处，地图编绘和制印工艺设计等工作。资料组由中共中央地方病防治领导小组办公室防治二处和各省、自治区、直辖市相应的机构选派一人组成，负责各地现有资料的收集、汇总和审核。第一次编委会审定和通过了编辑组提出的《图集》编纂工作大纲，以及资料收集原则之后，正式开始了《图集》的编纂工作，并设《图集》编纂办公室，负责日常工作；经历了四年半左右的时间，完成了《图集》的编制，于1985年1月下旬召开第二次编纂委员会，对《图集》的编稿进行了最后审定。

（三）

本《图集》的组成，分六个图组，共221幅图。有序图组（6幅图）、地方病环境背景图组（27幅图）、克山病图组（57幅图）、大骨节病图组（46幅图）、地方性甲状腺肿图组（38幅图）和地方性氟中毒图组（47幅图）。序图展示了我国疆域、政区、人口、民族和地方病分布等总概貌。地方病环境背景图主要介绍我国自然环境的基本特点，供读者认识、分析和研讨地方病与环境的关系时参考。其余四个病种图组构成本《图集》的主体，都由病种简介、地图、图表和照片四部分组成。其中又以地图为主，其余三者为辅。简介包括：概况，地理分布和流行特点，病因，临床、病理与生化，预防与治疗五部分。简介可使读者对这几种地方病有个初步了解。地图部分，依空间范围区分，包含有三个层次或尺度，即全国图、重点地区图和典型图。这既可满足认识全局总规律的需要，也能适应深入了解具体范例的要求。其科学内容，包括了病情、流行特点、致病（或病因相关）因素的地理分布和地域差异，以及地方病与环境关系的关联分析等。关于图表部分，它是地图的补充，给读者某些具体的数量概念。照片也是地图的补充，它不仅给读者以形象直观的知识，而且在一定程度上也能帮助读者更好地了解地图的科学内容。

本《图集》在内容上的突出特点是：不仅有系统、丰富和可靠的病情统计资料作为它的科学基础，可提供从全国到典型地段

的各种病情图；而且根据长期科研积累和观测实验结果编制了一系列能反映流行特点和病因关系的疾病生态环境图；整个《图集》及其各个组成部分也都贯穿和反映了“疾病与环境”的联系。众所周知，很多疾病的发生是与环境密切相关的。地方病更是如此，它与人们所经常接触的地质岩性、地貌、气候、水文、土壤、植物、动物、饮水、作物、食物、环境化学物质、社会经济状况、生活习惯等各种环境、生态和社会因素有着不可分割的联系。本《图集》为从空间上比较系统地揭示这种联系做了有益的尝试。

（四）

《图集》的资料主要来自两个系统。一是全国各省、自治区、直辖市党委地方病防治工作管理系统；一是地学和医学等地方病科研和防治系统（包括中国科学院、中国预防医学科学院、高等医学院校、地方病防治研究所、卫生防疫站以及有关地学部门等）。获得了全国按县为单位统计的四种地方病病情资料和饮水中氟、碘含量资料，以及重点发病地区以公社为单位统计的病情资料。病情资料分为二类：一类有多年逐月逐年的发病率表报资料，如急型、亚急型克山病资料。我国对克山病已建立了按旬、月、年逐级上报病情的正常制度。对这部分资料选用的年段为1959年至1982年。由于各省、自治区、直辖市建立表报制度的年代不同，在1959年以前只有少数省份有这类资料，所以规定的起始年代为1959年。在我国西南地区，由于该病发现较晚，所以有表报的年代较短，大多始自 60 年代，部分为 70 年代。平均每县有大约11年的表报记载。另一类是通过普查或抽查所得到的患病率病情资料。这一类有潜型、慢型克山病，大骨节病，地方性甲状腺肿（包括克汀病）和地方性氟中毒（氟斑牙和氟骨症）。在大多数病区上述疾病的普查率达到了70%以上，这对于一个地域辽阔人口众多的国家来说，确实是很不容易的事。至于一般的抽查资料也基本上能较好地反映实际规律。这些资料，有些是多年积累的，并且有些地方，特别是我国北方地区做过多次的普查或抽查，而南方的部分地区是按照本《图集》的要求进行补充调查的。因此在病情资料的选用上，不同病种略有不同。例如，潜、慢型克山病因大部分县有多次普查或抽查资料，选取1970年至1982年间所进行的历次调查平均数；大骨节病和地方性氟中毒主要选取最新的调查资料；地方性甲状腺肿考虑到要反映其服用碘盐前后的病情变化，选取能反映该病变化的二次调查资料分别制图。关于全国饮水中氟和碘含量资料，我国南北有很大不同，在北方省份大多进行了饮水氟、碘含量的普查、资料极其丰富。而南方各省则按《图集》要求，统一规定每县选取水样五个，样点必须大致分布在所调查县的东、西、南、北、中五个方位上，然后取中位数制图。制图结果基本上与有关病种的病情变化规律相符，较好地反映了我国饮水氟、碘含量的趋势及其与相应的两种地方病的关系。尤其是含氟量与氟中毒的关系更明显，因为水氟对地方性氟中毒的影响，比水碘对地方性甲状腺肿的影响更显著得多，其原因是水氟在人体摄入氟量中所占的比重相应地要比水碘在人体摄入碘量所占的比重大得多。综上所述，《图集》所依据的资料不仅量多、系统、齐全，而且比较确切可靠。当然，在全国这样广大的范围内，难免也存在局部地区的资料不平衡。为此，我们在资料使用中经过反复严格审查和采用类比和概率统计等方法，弥补了局部资料的缺陷，因而使制图效果在整体上达到了基本协调。《图集》设计时，为了保证病情资料的可靠性，制订了统一的调查表格，由各地资料员负责填报。并采用多层次反复审核的办法，对资料进行严格的审查核实。首先要求填报单位有专人审核，其次由编辑审核，对发现不确切、错误、缺项、漏项等问题再返回原填报单位或资料员，要求加以澄清、补充，甚至重新调查。第三是全体编辑组和资料组成员集中共同进行审查核实。在进行资料计算处理前，由各病种图组的编辑进行第四次审核。最后，在图件编成后，由资料组进行最后一次核查。经过这样多次反复的审核，基本上保证了资料本身的准确、合理和平衡。

至于第二个系统来源的资料，大多属于多年研究所获成果，是《图集》许多典型图编制的良好素材，它们一般有充实的科学基础和可靠依据。

（五）

本《图集》所采用的病情指标是粗患（发）病率，未采用标准化处理。因为，地方病与癌症、心血管病以及其它疾病不同，它有明显的地域限制，即地方性。

对所有病情资料经过统计处理，其结果四种地方病的分布呈明显的“L型”分布，并经过适当代换而通过了正态性检验（D检验法），证明资料的质量是可靠的。根据这个分布特点，本《图集》大部分病情图的分级指标原则上都采用二分之一递分法确定（有些典型图除外），其划分结果较好地反映了全国和各地的病情分布特点，即轻病区面积最大，随着病情的加重，其分布面积也缩小。而且在地理分布上也往往反映出轻病区围绕重病区而分布的特点。同时，为了便于将全国任何一个制图单位（县）的患（发）病水平与全国平均水平进行比较，经正态化后编制了四种地方病患（发）病率的离均分布图，它们反映了各县病情距离全

国水平的程度，这改进了表达病情的方式方法。另外，本《图集》所表现的病人性别、年龄、病程期度构成等图幅也均具有独特的表现特点。

本《图集》中的地方病与环境关系图和环境分析图大多数是最新研究成果，科学信息的选取指标有很明确的针对性，故具有一定深度，它揭示了不同环境要素或因子与地方病的联系。即使是序图组和环境背景图组各图幅，虽然其中有很大一部分是利用现有专题图作为基础，但均联系地方病病情进行分析研究，然后简化、综合、加工和改编，因而赋予了新意，已不同于原来的专题图，而更易于为广大读者所阅读，易于与有关疾病相联系。

整个《图集》由于基础资料充实，计算方法合理，又借助电子计算机的自动化处理，基本上能系统、综合地反映我国医学、地学、生物学和地图学等多学科在地方病领域多年最新研究成果，从内容到形式都有一些改进，期望《图集》能为众多学科和各个领域服务，并在使用中得到进一步丰富和深化。为有利于与国外进行学术和经验交流，促进地方病医学、地方病环境科学和医学地图学的发展，本《图集》采用中、英文对照出版。

致　谢

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《中华人民共和国地方病与环境图集》编辑组

1985年1月

Preface

I

China is a large country with a variety of landforms, soils and biological communities giving rise to a range of ecological environments. Although the ecological landscapes are different from each other in appearances and characters, they are related to local and regional conditions. Since ancient times, people have laboured, lived and multiplied there under these different conditions. They obtained from them what was required for growth, development and reproduction including various elements essential to life. Man inevitably interacts with the environment during historical development. Generally speaking man should be in harmony with the environment in which he inhabits. Human health, however, was sometimes affected owing to the failure of attaining the required equilibrium between human body and the environment as a result of abnormality of the ecological environment. The wide variety of ecological environments and special habits of the people have brought about the development of various endemic diseases. This Atlas gives full details of the distribution and epidemiology for a number of extensive endemic diseases caused by, or, related to environmental chemical factors. These include Keshan Disease, Kaschin Beck Disease, endemic goitre (including endemic cretinism) and endemic fluorosis.

Under the leadership of the Central Committee of the Chinese Communist Party and the Government of the People's Republic of China, investigation and the epidemiology, prevention and treatment of endemic diseases have been undertaken in many departments over a long period of time. Substantial scientific data inadequate in other countries of the world were collected. However the valuable data was scattered in different regions and departments all over the country. In order to control and eliminate the endemic diseases, it has been necessary to establish in general terms, their geographic distribution throughout China, their epidemiological characteristics as well as their relationships with the ecological environments, and particularly with the chemical ecological environment. To this end it is essential to analyse the important information in China in a comprehensive and systemmatic way. The compilation of the Atlas is one outcome of these investigations. It will assist leading departments concerned in working out overall plans for endemic disease control and treatment and allocation of suitable manpower and facilities for local conditions; in providing reference material for economic reconstruction and the buildup of national defense; in providing data for thoroughly studying pathogenesis; in providing visual material for medical education and popularizing knowledge of endemic diseases. It is expected to further promote cooperation in the fields of medicine, the geo-sciences, chemistry and biology of endemic diseases and to strengthen the international exchange in the cartography of medical geography.

II

In view of the information presented above, the compilation of an atlas of endemic diseases of China was put forward in 1980. Under the joint sponsorship of the Office of Lead Group of Endemic Diseases Prevention and Control of the Central Committee of the Chinese Communist Party and the Committee of Environmental Science under Chinese Academy of Sciences the first editorial committee meeting on "The Atlas of Endemic Diseases and Their Environment in the People's Republic of China" (referred to subsequently as the "Atlas") was held in early August 1981 and the tasks were defined. The editorial committee mainly took the responsibility for examining and approving the scientific content, method of presentation and design ideas to ensure a high quality Atlas. Two sections under the editorial committee were organized, namely, an editorial board and a material group. The editorial board comprised professionals from related research institutes and medical colleges and was responsible for the overall design of the Atlas, data processing, inviting contributions of original drafts, examination and revision of the scientific content, and the work on map preparation, drawing, printing and graphics. The material group comprised the Second Division under the Office of the Lead Group of Endemic Diseases Prevention of the Central Committee of the Chinese Communist Party and staff members from the endemic diseases offices of the Party committee of each province, autonomous region and municipality. This group was in charge of collecting and approving the available data for various localities. In addition, an office respon-sible for some routine duties of the Atlas compilation was established. Compilation of the Atlas formally started following the first editorial committee meeting which examined and approved the guidelines for compilation and principles for data collection put forward by the editorial board. It took approximately four and a half years to complete the compilation of Atlas. All the available manuscripts for the Atlas were then examined and approved at the second editorial committee meeting held in late January of 1985.

III

The Atlas consists of 221 map sheets in six series, namely, general map series(6 sheets), environmental background map series of endmic disease (27 map sheets), Keshan disease map series (57 map sheets), kaschin-Beck disease map series (46 map sheets), endemic goitre map series (38 map sheets), and endemic fluorosis map series (47 map sheets). The general map series provide an overview of China's territory, location of administrative regions, population, nationality and endemic disease. The environmental background map series of endemic disease mainly introduce the basic characteristics of the natural environment to help the reader analyse, study and understand the relationship between endemic diseases and their environment. The other four map series, i.e. those for Keshan disease, Kaschin Beck disease, endemic goitre and endemic fluorosis are made up of four parts—a brief account of the disease, the maps, charts and photographs. The brief account of the disease types includes a description of the general situation, geographical distribution and epidemiological characteristics, pathogeny, clinical symptoms, pathology and biochemistry, and prevention and treatment, which provides the reader with a preliminary insight into the diseases. In regard to the maps, there are three scales in accordance with spatial differentiation, i.e. maps of the country, of key areas and typical maps which illustrate the whole situation and also provide specific insights. So far as the scientific content is concerned, it covers disease conditions, epidemiological char-

acteristics, geographical distribution and regional differentiation of pathogenic factors (or pathogenic correlation factors) as well as association analysis of the relationship between endemic disease and its environment. The charts provide specific quantitative data and thus are supplements to the maps. Photographs also supplement the maps which provide the reader with vivid visual pictures and thus help him understand better the scientific substance of the maps.

In this comprehensive Atlas, much scientific and reliable statistical data of endemic-disease conditions has been included to the national and regional maps reflecting the epidemiolgical characteristics and pathogenic relationship from long-term scientific research, observation and experimental results. The relationship between "disease and the environment" is dealt with and is reflected in the entire Atlas. It is well known that the occurrence of many diseases is closely related to the environment. This is particularly so with the endemic diseases. It includes various natural and social factors such as geology, lithology, landform, hydrography, soil, plants, animal, drinking water, food, environmental chemicals, socio-economic conditions and social habits. The Atlas is the first major attempt at exploring such relationships in a fairly systematic way.

IV

The data for the Atlas has been derived mainly from two sources. The first comes from the endemic disease prevention and control management system under the party committee of various provinces, autonomous regions and municipalities. The other source is scientific research on prevention and control in the geosciences and medicine (comprising the Chinese Academy of Sciences, the Chinese Academy of Preventative Medicine, Endemic Disease prevention Research Institute, the sanitation and anti-epidemic station, geoscience departments and associated institutes of higher learning). Data on the four endemic diseases was obtained, including the drinking water fluoride and iodide content at national and county level plus disease conditions calculated to the commune level. Two types of disease ocurrence data were collected. The first covers acute and sub-acute Keshan disease conditions where the statistics for the monthly and yearly disease occurrence rate have been collected. A normal system of reporting Keshan disease conditions on a ten-day, monthly and yearly basis has been set up in China. The data considered here ranges from 1959 up to 1982. Before 1959, statistical data was only available from a few provinces, autonomous regions and municipalites. Moreover, this disease was discovered comparatively late in Southwest China with statistical data starting from the 1960's and partly from the 1970's. Thus the statistical tables and reports have been averaged for each county over the 11 year period.

The other types of data collected can be categorized as disease prevalence rate and disease condition obtained by a general survey or a sampling survey, of latent and chronic Keshan disease, Kaschin Beck disease, endemic goitre (including cretinism) and endemic fluorosis (dental and skeletal). The general survey rate exceeded 70 per cent in most disease areas which is unusual for such a vast country with such a large population. The ordinary sampling survey data on the whole also reflected the relationships in a reliable way. Some of the data have been accumulated over many years. In some places, particularly in North China, general surveys or sampling surveys have been carried out many times, while supplementary surveys were undertaken in parts of South China so as to provide data for the Atlas. The selection of the disease condition data varies slightly along with the different endemic diseases. For instance, average values of all previous surveys concerning latent and chronic Keshan disease occurrence conduced between 1970 and 1982 were used in most counties because of the availability of data from the repeated general surveys and the sampling surveys. In the case of Kaschin Beck disease and endemic fluorosis, the most recent data was used. With endemic goitre data, two separate surveys were used for mapping because of the possibility of changes influenced by iodized salt supply. With regard to the national data for fluoride and iodide in drinking water, the procedure varied greatly from North to South China. A general survey was conducted in the north where substantial data existed. However, in some provinces in the south, water samples were taken simultaneously at five locations—east, west, north, south, central—within the county. The median value was used for mapping. The results reflected the general changes of fluoride and iodide contents in drinking water which corresponded with the two endemic diseases. The relationship between the fluoride content in drinking water and fluorosis was more obvious than that between iodine and goitre. The reason is that the contribution to the total intake of fluoride from water is higher than the iodine intake from the same source. To sum up, the Atlas provides substantial data, collected systematically, which is accurate and reliable. As it is not easy to eliminate the imbalance of data for part of the country due to the vast size of China, the data was examined on a number of occasions. In any case analogue and probabilistic and statistical methods were applied before the data was used. In this way, deficiencies in some of the data were remedied, which leads to a harmonization of data before the commencement of mapping.

To ensure the reliability of data, consensus questionaires were prepared when the Atlas was designed and members of the material group from different places were invited to fill them in. Moreover, approval of the data was achieved through rigid application of repeated verification of the data at all levels. First, individuals from the organizations concerned were asked to examine and approve the data. Secondly once any inaccuracy, mistake or an omission happened the data was returned to the respective individual for clarification, completion or resurveying. Thirdly, all members of the editorial board and of the material group met together and examined and verified the data collectively. Fourthly, proofreading was carried out by the editors responsible for each endemic disease before the data was computerized and processed. Finally, the last examination and verification was made by members of the material group following the completion of mapping. In view of these procedures, the accuracy, reliability and balance of the data have been assured. In addition, the results from years of scientific research have yielded excellent source material for compilation of the maps and thus provided a sound and reliable basis for the Atlas.

V

The disease index adopted in the Atlas was based on the original incidence without giving any standardized treatment. This is because endemic diseases differ from cancer, cardiovascular and other diseases in having distinct regional constraints.

A statistical treatment of all the endemic disease data revealed that the distribution patterns of the diseases appear in distinct "L" shapes. The quality of the data was shown to be reliable for it passed the normality test (D-test) after proper transformation. As a result, the grading index for most of the disease maps was determined by the successive bisection method (excluding some representative maps). The results of such divisions reflect the material characteristics of the diseases fairly well, i.e. the slightly affected areas are the largest, while the areas of worst cases the smallest. Moreover, in terms of geographical distribution, the slightly affected regions encompass the seriously affected areas. In addition, distribution maps showing deviations of the disease prevalence or incidence rate from the mean values for the four endemic diseases were also compiled in individual map units (county) for comparison with the average national level. These maps reflect the difference between each county and the national level and assist in the improvement of the map display method of the disease data. The analyses by sex, age and serious extent of the diseases are further examples of the characteristics displayed on particular maps sheets.

Most of the maps illustrate the relationships between endemic disease and its environment and the subsequent environmental analyses reflect the most recent research findings. In view of the precise objectives laid down for the selection of scientific information it has been possible to relate different environmental elements or factors with endemic disease. Even in the case of map sheets in the general series and the environmental background series, they have been studied and analyzed in connection with the endemic diseases followed by simplification, combination, processing and revision. New meanings to the maps are apparent, which will help the reader to understand their relationship with endemic diseases.

Since substantial data has been provided in the Atlas by using computer methods and computer-aided processing, it represents systematically and comprehensively the recent multidisciplinary research achievement in the fields of medicine, the geosciences, biology and cartography relative to endemic disease. It is anticipated that the Atlas will be widely used and be of help to numerous disciplines and practical fields. The Chinese-English text of the Atlas will promote the academic interflow between China and foreign countries, and develop medical sciences related to endemic diseases, endemic environmental science and medical disease cartography.

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January 1985

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序图

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地方性甲状腺肿与地方性克汀病图