

**UKRAINE:**  
**HEALTH PROBLEMS AND PRIORITIES IN A REGIONAL PERSPECTIVE**

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On one hand, if we look strictly at overall population size, Ukraine would rank as one of the largest countries in all of Europe. With 52 million persons, two-thirds urban, with much industry, agriculture and transport nodes, it could be a significant player on the international scene, if..... But caveats do have a meaning, and in this case the economic condition of the country, its inheritance from the Soviet Union's style and practice, its difficult emergence and clouded future, leave many questions about its viability, and therefore its role on the larger scene. Putting aside the economic and concomitant political dimensions of its problems, and concentrating on the health and associated environmental problems affecting the population of Ukraine, much needs to be done. In the present brief report, emphasis is laid upon the regional dimension in particular as part of an effort to determine not only the macro health issues, but to which region (oblast) of Ukraine priority attention is required. And priorities can be seen readily in the interregional differentials in many indicators. Other than Chernobyl-related impact zones, industrially developed regions have high illness incidence rates associated with pollutants. Sometimes more agriculture-based regions have high illness rates associated with use or abuse of pesticides, mineral fertilizers, poor sanitary conditions, and the like.

Addressing these issues in more detail, then, is the major task of this interim medico-geographic report. Many data have become available only in December of 1994 through new sources on health (with a very limited print edition of only 20 copies) and another on environment (76 copies) in Ukraine. These sources serve as the principal statistical underpinnings of this report. But they do not provide sufficient insights into current trends. And this aspect of the report is based on current newspaper, radio and other media sources

available in the short period assigned to this task. In addition, several UNICEF/WHO and World Bank reports have been utilized. Sometimes the data found in various resources conflict. This is not surprising. And in no case can one be absolutely certain of the quality of a given datum or of data. Selection of which data to use was made essentially on the latest publication date, official versus unofficial and context in which the data are presented. Thus, while many questions remain about the quality of the data, a detailed on-the-spot review is required before greater certainty can be asserted.

One other, important caveat must be mentioned at this point. The spelling of Ukrainian oblasts, cities and the Republic of Crimea are shown as given in the sources, and here, in varying Russian and Ukrainian versions. I have essentially chosen to utilize the spelling in the original sources utilized for this effort. For example, Zaporozhye in Russian, or Zaporyzhzhya in Ukrainian is fairly obvious that they are the same. Krym is Crimea in English. With one important exception, this is the pattern followed here. However, Nikolayev can be written as Nikolayiv, or more correctly in Ukrainian, Mikolaiv; this (initial letter shift) is the single most serious spelling change of which I am aware. Thus, with only the latter exception, it is believed that all other names/designations of areas and cities are close enough so that no effort has been made or time spent to adjust them, except in rare instances; hopefully, the acknowledgement of the problem will suffice for the reader.

With a population of 52.2 million at the beginning of 1993, Ukraine is one-third the size of Russia (at 148 million persons), but in the same basic size range as the four largest European

countries --United Kingdom (57.3 million in 1991); Italy (57.8--1991); France (56.7 --1991) and united Germany (somewhat higher, at 79.8 million--also in 1991). Its crude birth rate at 11.5 births per 1000 population in `1002 is below that of France and Poland (at 13.5 and 14.3, respectively, in 1991). Its crude death rate, however, at 13.4 deaths per 1000 population in 1992, is sharply higher than the rate in France (at 9.3) and in Poland (at 10.6) in 1991. The trends since 1986 in births indicates a drop of 4.0 births per 1000 population since its peak of 15.5 in 1986 and an increase of 2.3 per 1000 population since its low point in the same year, 1986. Current difficulties, to say the least, in its economy, in its society, in its health and environmental trends indicates that the lows and highs have not yet been reached.

The last, more direct demographic indicator needing comment in this introductory sections relates to life expectancy at birth. This is the single best overall measure (with infant mortality more specific to reproductive health and health of the newborns). While not as dramatic a decline as in Russia, life expectancy has declined in Ukraine from a peak of 70.9 years of life expectancy at birth on the average in 1989 to 69 years in 1992 for both sexes; for males, the corresponding figures are 66.1 and 64; for females, 75.2 and 74. I do not have more recent data, i.e., for 1993 and 1994, but from all indications given health and other problems, including that of crime, it is highly likely that the levels dropped further for life expectancy at birth.

The basic format for the remaining portion of this report is to first examine the principal health developments, then environmental issues, potential health problems, and lastly, a brief

summary-cum-priority setting discussion emanating from the prior sections. Throughout this report, tables and maps are incorporated to distinguish relative regional patterns. Unfortunately, regional data are not available for all principal illnesses such as they are for tuberculosis, but this neither diminishes the importance of this illness itself, and secondarily, this does not mean that the regional tables (and maps) have little or no meaning.

#### A. Principal health developments

The most important issues selected for this analysis are those of reproductive health of mothers, of child health, and of infectious diseases. Only addressing infectious diseases, out of the 17 or so major classes of disease, does in no way diminish the leading importance of heart and cancer illness which continue to contribute some two-thirds to three-quarters of all deaths. And if expectations that thyroid and other cancers will increase as part of the long-term consequences of the Chernobyl accident, then the share of this component may even increase. But the charting/mapping of the new information would indicate that much more attention should be paid and priority given to this element of health trends than the standard, albeit extremely important degenerative diseases of heart and cancer as a cause of death. But new development in infectious diseases are becoming statistically significant and worrisome for the future health of the population, and even more so in particular regional sites.

If one estimate made by the Ukrainian medical authorities is correct, then 94 percent of Kiev's children are sick. Diagnostic studies of 5,980 children in 18 schools and kindergartens,

between the ages of 1 and 14 years, found an astonishing 28 to 32 percent of them with precancerous conditions of the blood, internal organs and skin. According to the authors of the article in Molod Ukrainy (9 February 1993, p. 3), these children will develop cancer in the near future, if they have not already. The director of the Medical Nutrition Research and Prevention Center indicates that examinations in areas outside Kiev also show that Zaporozh'ye, Donetsk, Chernohiv, Nikolayev and other cities, in addition to Kiev itself, have seen significant increases in illness/disease of the thyroid gland, anemia, osteogenic sarcoma, intestinal microflora, thrombocytopenia, leucopenia, damaged blood cells and tuberculosis. From 1980 to 1992, the last full year before publication of the article, these diseases increased by no less than 23 times (up to 28 times). It is not known if the increases are per 100,000 children in these age groups, or in absolute terms. With a total population growth, however, of only 2.5 million persons since the Census of 1979 until the beginning of 1993, or some 5 percent, the increases of about 25 times, as the approximate mid-point of the increases cited above, far outweigh any concomitant (minor) per capita adjustments.

Putting aside for the moment issues of illness related to radioactivity from the Chernobyl accident or local hotspots ensuing therefrom, the entire issue of **infectious diseases** (tables 1-3, figures [maps] 1-4) must be denoted as an area of high priority. Again while not (yet) responsible for a major share of all deaths in Ukraine, it has the potential to expand sharply--as it has in the case of diphtheria, cholera and tuberculosis--to become a much larger share of all morbidity and mortality. According to the Ukraine country study issued by the World Bank early in 1994:

Infectious disease continues to cause avoidable deaths. The Standardized Death Rate [per 100,000 population] for infectious diseases is 55 percent higher than in Belarus, 33 percent higher than in Poland and three times as high as in the United Kingdom. About 4,500 people died of tuberculosis in 1990. Except for persons 75 and older, age-specific death rates for tuberculosis in Ukraine are greater by two to nine times than in Poland, which is generally acknowledged as having one of the significant tuberculosis problems in Europe.

And while not specified as directly applicable to Ukraine, but clearly must be treated as such:

The World Bank's World Development Report 1993 "Investing In Health" gives special emphasis to tuberculosis control as one of the highest priorities and most cost-effective, public health interventions.

This statement applies in full to Russia and other parts of the former Soviet Union as well as to Ukraine.

If in 1985, the incidence rate per 100,000 persons with newly diagnosed cases of active tuberculosis was 41.2, it dropped subsequently to 31.9 by 1990, but has since increased to 35.0 in 1992. Ninety percent of all tuberculosis is active TB of the lungs, particularly associated with poor economic and sanitary conditions, and especially alcoholism. The death rate for active tuberculosis had decreased from 10.2 per 100,000 population in 1985 to 7.8 in 1989, but again increased to 8.1 in the next year. It is believed that the rate has continued to increase not only based on the overall statements about increases in tuberculosis as well as other infectious diseases cited above, but also because complex antibiotics, more than other, less expensive medicines are in short supply from domestic sources. Therefore there is a great need for hard currency to purchase such medicines from outside sources or acquired from donors; but these may be limited in amount and timing to meet possible epidemic levels of some diseases..

If we look at the regional dimension of new cases of **tuberculosis**, we can see from table 4 and figure [map] 5, that the national average for Ukraine of 35.0 cases per 100,000 in 1992 is markedly exceeded in the Donets'ka (45.8), Nikolaivs'ka (41.9) Khersons'ka (45.7) and Chernigivs'ka (40.8) oblasts. In absolute terms, Donets'ka oblast is the location of almost one-tenth of the entire country's absolute total number of new cases (18,140) in 1992. (This is approximately its share of the total population of Ukraine as well.) A new immunization program for Ukraine was promulgated for the years 1993-1994, largely on the basis of a "sharp increase" in the number of cases of diphtheria. But tuberculosis, as well as polio, measles and viral hepatitis also are specifically cited as being widespread (Meditsinskaya gazeta (Moscow), no. 86 (5414) 29 October 1993, p. 3.)

Ukrainian medical authorities clearly are concerned about the incredible rise of **diphtheria** in Ukraine, a rise mirrored in Russia and elsewhere in the former Soviet Union. When Poland recorded 521 new cases of diphtheria by the spring of 1993, the medical authorities in Poland were put on "red alert" against its spread from neighboring Ukraine. In the Ukraine itself at the end of the summer of 1993, about 1800 cases were recorded. Of the total number of cases, some 50 persons had died. Sharp increases in the illness, and consequently of deaths, were cited for Nikolayev, Kherson, Ivano-Frankovsk, Poltava and Kiev oblasts, as well as the Crimean Republic and Kiev city. (Table 1.) Some of these overlap with the increases or high rates in areas with tuberculosis--Khersons'ka, Nikolaivs'ka and likely others not enumerated in the source.

While the 1800 cases of diphtheria in the summer of 1993 was twenty percent more than in the whole of 1992 (1553 cases), by the end of the year there were 2987 cases recorded in Ukraine. This represents an increase of 40 times the number recorded only 8 years earlier (i.e., 75 cases in 1985). The standard medical goal is that some 90 to 95 percent of the population be immunized to prevent an epidemic. Thus, it is unclear how many are immunized, in how many has it become effective, and how many (or rather, what proportion) are actually immunized. Thus, very recent World Health Organization statistics show that 90 percent of the population of Ukraine have been fully immunized, i.e., DPT3--the full course of diphtheria, pertussis and tetanus shots. In contrast, only 65 percent of the population of Russia, 86 in Belarus and 87 in Moldova, have been fully immunized according to these data. (See table 5, and charts 1 and 2.) If 90 percent have actually been immunized, then why have the increases in incidence been so dramatic? Is the vaccine inadequate? Or more likely, is the report in a leading Moscow environmental newspaper of January 1994 more accurate when it indicates that only 67 percent of the population of Ukraine had begun the course of diphtheria inoculations, and only about 37 (!) percent had completed the full course. (Spaseniye, no. 2, (103), January 1994, p. 1.) Early in 1992, a UNICEF/WHO mission team similarly estimated a lower coverage figure. They found that only 75-79 percent DPT coverage ratio for infants, and not the much higher figures cited from official sources.

Several years ago, an estimate was made by WHO that Russia and Ukraine together represent about 95 percent of all cases of diphtheria in the 50 European states; by the end of 1994, they may well be 97-98 percent or even more of all cases in Europe given the expectation

that in Russia at least, the number of new cases more than doubled (from 15,229 to about 35-40,000 cases) between 1993 and 1994.

Having indicated the shortfall in immunization coverage ratios, the UNICEF/WHO combined team report for their visit in February of 1992, was pessimistic that this situation will be rapidly improved. To quote, "Vaccines are not produced in Ukraine, and in the past supplies have come from 39 institutions located in other CIS countries." According to this source, the Ukrainian government had contracted with the Merieux firm (country not given) to supply DPT vaccine in "sufficient quantities to cover national requirements." Whether this has been effectuated, whether the monies have been sufficient, whether the supplies have actually been provided is not known--but given the recent economic situation, the political uncertainties and the general thrust of all commentaries on the health situation, it is doubtful that this program/agreement has been carried out since this team visited Ukraine. Clearly rationalization of this problem is urgent. Belarus also does not produce its own vaccines, and also is dependent on vaccine supplies from outside sources. I am not aware of vaccine production in Moldova; it is doubtful if they provide for their own needs as well.

Much ado, properly, has been given to the rise in **cholera** throughout Ukraine during the period 1992 to 1994. The report for mid-September 1994 indicates that up to that point in time, some 406 cases of cholera were recorded throughout the country. More than half the number of cholera incidence was found in Nikol'ska oblast alone (251), another quarter in the Crimean Republic (111 cases) recorded to that date, and the rest scattered in various cities such as

Kherson (15), Dnepropetrovsk (13), Zaporozh'ye (10), Kirovgrad (2), L'viv (2), Chernovytsy (1) and 1 in the Zhitomirs'ka oblast. Dr. Semenyuk of the Main Epidemiological Directorate of the Ukrainian Ministry of Health denied that any cases had been recorded in Kiev city or Kiev oblast (at least, up to that time). By 27 September 1994, 478 cases of cholera were recorded in all of Ukraine, of which, eleven persons had died.

Undoubtedly in the minds of the population, and obviously of the government, the spread of cholera is reminiscent of historic epidemics; something needed to be done. President Leonid Kuchma of Ukraine ordered the formation of an Anti-Cholera Commission "to supervise cholera control." First Deputy Prime Minister Valeriy Samoplavskiy, was designated as the head of this Commission. Localization of the epidemic was stressed in the announcement. Particular reference was made to the spread of the illness in the Crimean republic, Nikolayev, Kherson, Zaporozh'ye, Kirovgrad and Chernovtsy regions, again underscoring the reports on the number of cases by region and/or city cited above. Almost simultaneously, the Crimean Republic formed its own "Extraordinary Anti-Epidemic Commission for Localization and Elimination of Cholera Infections in the Republic of Crimea." Emphasizing the especially bad situation in Simferopol city and oblast, the initial indications were that the cholera vibrios likely were to be found in water sources, but that had not yet been confirmed. Reporting for the local newspaper, Krymskaya Pravda, the author commented that a spread of the disease to Sevastopol was not surprising given the "unsanitary conditions in residential areas." According to the article, "the local municipal service, water control, city disease control station, the internal affairs committee,

and health care administrations are negligent of their duties." (30 September 1994, p. 1.) Thus, while the cholera epidemic may have peaked by the beginning of the winter of 1994, the underlying conditions have not been eliminated. If this is still the case both in this city and elsewhere in Crimea and the rest of Ukraine, then a further growth can be expected. Even more preventive efforts and/or remediation will be needed.

Without extending this summary of illness into a lengthy detailed discussion of all diseases, it would nevertheless be amiss not to mention the growing concern about **HIV/AIDS**. While the current numbers are still very low, indeed extremely low in comparison with the United States, for example, there is evidence of growing concern in the country and the potential for large growth. A growth in numbers of HIV/AIDS cases also implies treatment which the government of Ukraine cannot afford. In particular, the potential for growth is manifested in the increase in venereal diseases being discovered. Growth in venereal diseases can be considered as precursors of HIV/AIDS, as well as indicative of unprotected sex and the growth in hard drug abuse. When combined with the lack of sanitation in most if not all medical facilities, and growing contacts with foreigners who may be carriers if not actually ill with HIV/AIDS, a growth in this disease (of HIV/SIDS) is very likely to spread rapidly..

The total number registered with HIV since 1987 in Ukraine was 337 by October 1993; of these, 196 were foreigners; 8 adults and 4 children had died. But the trend is also important. Later in the year, a figure of 371 cases were registered in Ukraine, with 207 foreigners included

in the number (all of whom were deported).

The reported number, however, may be only a bare minimum of the "true" number. Among other reasons for this lacunae is the lack of any diagnosis of blood at donation points throughout the country. That is, none of the blood currently donated is tested for AIDS at this point, and possibly beyond at later stages before being used for transfusions. The estimated demand for such testing equipment is US \$8 million. There also is a major shortfall in medical equipment of all types--from the very basic such as blood analysis, blood typing and diagnostics.

The growth of **venereal diseases** among the younger population is very serious and should be an issue of rising concern. Young people demonstrate a 75 percent higher growth rate of infection with venereal diseases than adults in comparison with several years ago. More than 60 percent of young women who contract gonorrhea become infertile. The small port city of Melitopol in Zaporozh'ye oblast has more cases of syphilis recorded than in all of the much larger Odessa. If in 1976, the recorded syphilis rate of new cases per 100,000 population was 19; then currently it is more than 130. This illness rate is far above that for the oblast. According to the Ukrainian Ministry of Statistics, the syphilis rate for the oblast as a whole was 18.4 (up from 8.2 in 1990), not to any degree similar to the 130 per 100,000 rate for the city cited. Even Odessa oblast recorded "only" 52.7 per 100,000 population with syphilis in 1992--almost three times the rate for Ukraine as a whole. (Table 6 and 7, figures [maps] 6 and 7) Syphilis rates among 15-17 year old females was 2.5 times higher than males of these ages, and

1.3 times greater than males among 15-17 year old females with gonorrhoea, but "only" 87 percent as high a rate (per 100,000 population) among 18-19 year old females relative to males. The rate of increase therefore, leads to foreboding about the potential growth of HIV/AIDS and the need for efforts to prevent venereal diseases among the young, especially. New cases of registered drug and toxic substance abuse increased by 1.5 times between 1990 and 1992. (Table 8.) Adhering to the overall pattern, Odessa oblast almost doubled and Zaporizh'ka oblast increased by two-thirds, both double or so the national rate for Ukraine (18.1 -- Zaporizh'ska oblast, 202. -- Odessa oblast, and 9.7--Ukraine). However, Dnipropetrovs'ka oblast topped them all at 25.1 in 1992. (Figure [map] 8.) Having noted these figures, however, we must be certain whether it only relates to use of hard drug, whether there is multiple use of syringes and needles, and what is the share of toxic substance abuse, before attempting to correlate these rates with the actual or potential rate of growth of HIV/AIDS. Unfortunately, that information is not available. But, assuming ceteris paribus, the overall increase also indicates that growth may well have taken place across the board, the potential risk-taking population also increased.

In addition to the negative situation prevailing in Ukraine regarding tuberculosis, diphtheria, cholera, and venereal diseases (as a marker of potential growth in HIV/AIDS), numerous reports on the high incidence of **typhoid, diabetes, and bacterial dysentery** must be noted. In addition, the Ministry of Health's Main Administration for Sanitary-Epidemiologic Oversight as well as the office of the Chief Public Health Physician, are concerned about the growth of **polio, leptospirosis, human anthrax** and other diseases "from the past".

**Typhoid** seems to be cropping up throughout the region in 1993 and later, with reports about its occurrence in the Transcarpathian area, the Crimea, and east Ukraine, as well. That is, in all geographic regions. Table 1 shows that in 1992 particularly high rates of typhoid and paratyphoid (per 100,000 population) were recorded in Lugans'ka, Rivnens'ka, Odes'ka, Zakarpats'ka and Ivano-Frankivs'ka. Also associated with bad food and bad water, **bacterial dysentery** appears to be getting worse. Zaporiz'ka oblast as well as Simferopol in Crimea are among the hardest hit in 1994. In the latter case, due to capacity problems local infectious disease hospitals are not accepting new patients with **hepatitis A** as well as dysentery. Both illnesses are explicitly linked to poor quality water in the area.

If we look at the available (1992) bacterial dysentery regional data, bacterial dysentery is recorded at almost twice the national Ukrainian rate (of 39.1 per 100,000 population) in Khmel'nits'ka, Vinnits'ka, and Odes'ka oblasts as well as in the Crimean Republic. Given the reports of rising rates of such dysentery, it is clear that the **quality of water** must be worsening.

Evidence about the lack of water being cleaned at all, let alone partially brought up to standards, may be detected also in the regional data, now available for 1993. In comparison with the figure for 1990, uncleaned water dumped into surface waters without any purification increased by more than two-and-one-half times in the 3 years overall, and in some regions astonishingly more so. Thus, table 9 (and map 9) shows that in 1993 there were 1,196.2 million cubic meters of such uncleaned water dumped throughout Ukraine, with only 470.2 million cubic meters in 1990. But in the city of Kiev there must have been a complete breakdown in the

water purification system as the 1993 figure exceeds the 1990 by over 109 (sic) times (43.8 million cubic meters in 1993 and 0.4 million cubic meters in 1990). A similar explanation seems appropriate for the situation in Odes'ka oblast as well; this amounts to an increase of almost 62 times in the total amount of uncleaned water dumped into surface waters during the same 3 year period. High increases--though far below these rates (but above the national increase) also were recorded in the Dnipropetrovs'ka, Lugans'ka, Kharkivs'ka and Khersons'ka oblasts. Dumping of untreated water increased between 1990 and 1993 into the Black Sea and the Sea of Azov as well. For the Black Sea, the absolute amount increased from 389.5 million cubic meters to 736.4, and for the Sea of Azov, from 79.8 to 458.5 million cubic meters, in 1990 and 1993, respectively. It would appear, therefore, that one of the priorities for assistance in the environmental health realm is immediate improvement in water purification facilities--either through repair or installation of temporary and then permanent facilities. When combined with the cholera situation in which many vibrios are found in the waters of the country--especially in the southern region--then this may be one of the most important tasks to be carried out in the near term.

What has been described and analyzed up to this point essentially are short-term issues, albeit some may take time to develop and be implemented. But there is another problem which is a potentially greater catastrophe. And that is the long-term issue of the **deterioration in the gene pool** of the country's population. This is not very easy to pin down, even to document, but accumulating evidence from statistical sources--not always the most reliable, but indicative--statements and research by medical authorities who should know, and analogies with other areas

suggest that it is an extremely important matter..

Having indicated this problem with words, then how does one document the level and direction of the problem?

Perhaps the strongest single statement about the range and depth of the problem came from Professor Liubomyr Pyrih, a people's deputy, chairman of the Subcommittee on the Preservation of the Nation's Gene Pool and Protection of the Population Against Dangerous Ecological Factors, corresponding member of the Ukrainian Academy of Sciences. Writing in Holos Ukrayiny on 11 October 1991, Pyrih finds evidence for a potential disaster to future generations in a multitude of factors and trends. Thus, the decline in the life expectancy of males, especially when compared with that of females, he stipulates, is reflective of the "excessive mutational load" on males. For example, he asserts that the decline in viable sperm count among males over the last 20 years from 70 to 30 percent is evidence of danger to the gene pool, as are the increase in the number of children born with abnormal weight, with congenital birth defects, the number of deformed children born, and spontaneous abortions. The number of spontaneous abortions has "grown recently by four-six times." But we do not know the base data utilized to in the measurement of this rate of increase. Nor do we have a good measure of the total share of all spontaneous abortions to total live births.

Comparing heavily polluted Zaporozh'ye with relatively clean Simferopol, he asserts that researchers have found "five times as many mutationally-induced **spontaneous abortions** and

twice as many congenital defects in infants" in the former compared with the latter city.

According to Pyrih then "The Ukraine is heading for an ecological abyss, crossing the line to genetic catastrophe; her population faces the threat of degradation and extinction. If the present tendencies in the dynamics of mainly ecologically- and socially-induced mutational processes continue, geneticists predict an avalanche-like genetic catastrophe in 100-200 years." Long-term predictions may be safer to make than short-term effects which require remediation if at all possible. Nonetheless, reinforcing Pyrih's seemingly hyperbolic alarms is the research done at the Ukrainian Ministry of Health's republic Scientific Hygienic Center. In an article published in the March 1993 issue of the Russian Academy of Medical Sciences, the authors found not only a direct link to environmental pollution in the cities of Simferopol, Zaporozh'ye, and Mariupol', but also a "mutagenic uptake" in the heavily polluted cities. Compare, for example, the rate of children born with congenital malformations in the 3 cities cited. Official city health agency data show the annual average frequency of such births in Simferopol to be 7.7 per 1000 births, 11.5 in Zaporozh'ye and 20.2 in Mariupol'. That is, the latter with the worst pollution levels, witnessed 2.6 times as many congenital anomalies as in the control city of Simferopol.

Extensive reference to international standard methodologies would seem to indicate that this research was done in a standardized format making it likely to be more comparable, using proper evaluation techniques, and therefore important to consider when determining priority programs and actions.

It should be noted that the WestNIS countries of Ukraine, Belarus and Moldova, experienced (or rather recorded) the highest shares of all infant deaths due to **congenital**

**anomalies** in 1989 per 10,000 births in all of the former Soviet Union. Thus, the national rate of 31.2 such deaths, was exceeded in the 3 countries as follows: Ukraine--37.6, Belarus--36.1 and Moldova--42.1. [Vestnik statistiki, no.7, July 1991, p. 78. Surprisingly, the Baltic countries also recorded high rates: ranging from 34.9 in Estonia to 39.9 in Lithuania. I would speculate that diagnostics are more precise in these areas yielding such high shares; but this may be a rationalization of the unexpected high rates in these locations. Perhaps the high rate of alcohol abuse is a contributory factor in the Baltic, however.] Similar cause-of-death rates for each country since 1989 are not available. Regional (oblast) data in each year during the period 1986-1990 are available, but less useful than would be data--if available-- for the period since 1992.

Standardized death rates for congenital anomalies were studied by the World Bank. They found that the rates of deaths for males --414.1 for males, and 355.5 for females--from congenital malformations at birth in Ukraine is more than twice as high as in the United Kingdom, where the rates are 173.9 and 139.8 for males and females, respectively. Is this purely medical delivery or are their "anomalies" worse due to chemical, radioactive or other pollutants such as heavy metals?

For the short-term, medical-genetic centers had been organized in presumably the key areas of concern --in Kiev, Lviv, Kharkov, Kryvyi Rog, Simferopol, Donetsk and Odessa. Concern over the growing number of children with Down's Syndrome, phenylketonuria (PKU), and cystic fibrosis, were scheduled for priority attention.

At this point, before summarizing the findings of this very brief inquiry into the priority

areas for medical assistance, it behooves us to display and review the varying levels of **air pollution** from solid particulates, gasses and liquids. (Table 10.) To the degree that they affect reproductive health, and the consequent impact on congenital anomalies, then the differentials (as witnessed by the study of such anomalies in Simferopol, Zaporozh'ye and Mariupol', above), this air pollution factor could be determining of priority environmental health needs as well. To balance the anthropogenic burden of all pollutants from stationary sources, per capita figures were derived. From these latter figures, it can be seen that the highest tonnage of solid particulates, gasses and liquids per 1000 population in Ukrainian cities falls on the population of Enakieve, followed by Kriviy Rig.

In general, the problems in Belarus and Moldova parallel that of Ukraine. This is especially true in terms of the production of vaccines--again the Ukrainian medical services had been dependent on suppliers from Russia, Uzbekistan and other republics of the former Soviet Union and east Europe. Now with hard currency required for purchase from "foreign territories," they are short of such supplies. In addition, basic diagnostic equipment, cold chain facilities, sutures, syringes and other basic medical instruments are needed. While I do not have ready-to-hand morbidity data, oblast by oblast, for Belarus or for Moldova as a whole (no oblast breakdown), it would be possible to assemble some materials. Likely, however, these materials would only reinforce (for non-radioactive-related illnesses such as thyroid cancers) the patterns of Ukraine--diphtheria, hepatitis (though in the past much higher in Moldova), bacterial dysentery, and so forth. Older information on these diseases is available, but a separate effort would be required to prepare a set of materials for subregional breakdowns. Diabetes problems

in the other 2 countries/republics, as in Ukraine, also are serious. Part of the current problem is the supply of pure insulin. While not all diabetics in Ukraine, for example, are insulin-dependent, 77.4 percent of children 0 - 14 years of age in 1990 were so dependent while only 19.0 percent of all adults 15 years of age and older were dependent on insulin. With widespread endemic goiter in Belarus, for example, due to a lack of iodine in foods, iodized salt, etc., there is a large potential for growth of this problem in the region.

## B. SUMMARY

Patterns of illness overall and regionally emerging from this quick, brief effort would seem to underscore the need to direct efforts to and in specific regions to mitigate the rise in tuberculosis and diphtheria, and to improve water quality as a vector of illness, especially cholera, dysentery and hepatitis. Within the overall effort, priorities can be determined from the evidence adduced in this report by region. While not all the data sets and maps are for the most recent period, i.e., 1993 let alone 1994, the textual materials allow us to reinforce the regional priorities by current reports on health problems.

Thus, using the table and map for active tuberculosis rates standardized per 100,000 population, the dominance of the Zhytomyr and Kherson oblasts , with Odesa and Chernihiv close behind, are clearly the regions of "choice" for assistance. In contrast to the regions with the highest rates in Ukraine with diphtheria illness in 1992--Kiev city with quadruple the national rate and Odesa Oblast at triple the same average national rate, in 1993, large increases

reportedly took place in Nikolayev, Kherson, Ivano-Frankovsk, Poltava and Kiev oblasts, as well as the Crimea-- would indicate its acceleration into other regions from the earlier date. Again Kherson and Odesa oblasts stand out as among the worst regions, and therefore of higher priority needs. Odesa is significantly higher in the number of cholera cases in 1993 than all oblasts other than the Nikolayev oblast (also cited above as showing health deterioration due to increases in diphtheria), but Kherson city (if not the oblast per se) also is indicated as having a significant number of cholera cases. Odesa oblast again has the highest (or among the highest in other cases) recorded rate of an illness, in this instance, the 1992 rates for syphilis. Not only is the disease rate almost triple the national rate, but is some 50 percent higher than the next regional rate (52.7 compared with 35.1 in Kirovohrad oblast, and 18.8 per 100,000 population for Ukraine as a whole). For gonorrhoea, however, the highest level recorded in 1992 was found in Kiev city, double the national rate (169.8 and 85.7, respectively). Both Zaporizhya and Sumy oblasts recorded 133.2 cases per 100,000 population, with Dnipropetrovsk closely behind. Zaporizhya has high levels or rates of air pollution and wastewater as is Lugansk, Dnepropetrovsk and Donetsk oblasts in ascending order. Individual city air pollution data per capita reinforces the overall pattern.

Thus, while a composite index has not been prepared in the short time allotted for this effort, it is clearly evident from the foregoing that illnesses by region are differentiated sufficiently. And therefore, the efforts of AID and other associated agencies and organizations can utilize these materials to set priorities on a macro level for certain illnesses (as above, tuberculosis, diphtheria and cholera) and on a micro level (for individual oblasts, such as

Kherson, Odesa, Kiev, and the heavily industrialized area of the Donets and Dnepropetrovsk regions). Crimea seems to be in a special case, with very frequent mention of the republic as a whole or individual cities such as Simferopol, which are among the worst sites. Even this initial overview of the medical geographic aspect of the health situation, including selected environmentally-related measures, indicates the utility of taking the regional approach to determine priorities. Utilization of a geographic information system would make the analytical conclusions much firmer, technically clearer and show the interrelationships better. But even from the simplified approach taken here, some important highlights can and have been made.

## Infectious Diseases

(Number of cases)

Incidence of Disease	1985	1990	1992
Typhoid and paratyphoid A,B,C	698	172	249
Salmonellas, thous.	8.9	16.5	19.7
Acute digestive disorders, of which	168.4	107.3	107.0
Bacterial dysentery, thous.	61.3	22.5	20.3
Yersinosis	-	304	146.0
Brucellosis	8	-	4
Diphtheria	75	109	1553
Pertussis, thous.	8.1	4.2	3.4
Scarlet fever, thous.	47.4	32.2	19.8
Menigococcal infections, thous.	3.4	1.7	1.6
Acute poliomyelitis	2	-	12
Chicken pox, thous.	227.4	190.8	159.4
Measles, thous.	33.2	6.8	13.3
Viral hepatitis, of which	122.2	147.6	132.7
serum hepatitis, thous.	12.3	15.3	12.0
Mumps, thous.	30.1	36.9	14.6
Rickettsiosis	92	119	105
Malaria	584	91	86
Influenza and other acute upper respiratory diseases, mln.	15.4	12.5	10.9

**Infectious Diseases**  
(Number per 100,000 population)

Incidence of Disease	1985	1990	1992
Typhoid and paratyphoid A,B,C	1.4	0.3	0.5
Salmonellas	17.5	32.0	37.9
Acute digestive disorder, of which	330.7	207.8	206.2
Bacterial dysentery	120.4	43.6	39.1
Yersinosis	-	0.6	0.3
Brucellosis	0.02	-	0.01
Diphtheria	0.1	0.2	3.0
Pertussis	15.9	8.1	6.5
Scarlet fever	93.0	62.3	38.2
Menigococcal infections	6.7	3.3	3.1
Acute poliomyelitis	0.0	-	0.02
Chicken pox	446.6	369.5	307.2
Measles	65.2	13.2	25.6
Viral hepatitis	240.0	285.8	255.7
including serum hepatitis			
Mumps	59.2	71.5	28.2
Rickettsiosis	0.02	0.2	0.2
Malaria	1.1	0.2	0.2
Influenza and other acute upper respiratory diseases	30165	24194	21065

## Infectious Diseases, 1992, by Oblast

(Number per 100,000 population)

	Typhoid and paratyphoid A, B, C	Bacterial dysentery, thous.	Diphtheri a	Pertussis, thous.	Chicken pox	Measles	Viral hepatitis	of which Serum hepatitis (B)	Mumps
Ukraine	0.5	39.1	3.0	6.5	307.2	25.6	255.7	23.2	28.2
Respublika Krym	0.2	<b>66.8</b>	2.1	<b>15.5</b>	<b>456.7</b>	35.2	260.4	28.2	18.3
Vinnitsya obl.	0.6	<b>75.3</b>	1.4	7.3	230.3	38.7	263.1	28.0	26.4
Volnys'ka obl.	0.6	28.3	0.9	5.0	220.8	11.2	245.5	10.1	<b>52.1</b>
Dnipropetrovs'k oblast	0.3	39.2	1.4	5.8	320.3	7.9	261.8	<b>33.5</b>	40.0
Donets'k obl.	0.3	18.6	1.3	6.3	386.0	11.5	269.6	<b>32.2</b>	16.2
Zhytomyr obl.	0.7	<b>58.1</b>	0.7	7.0	226.5	<b>157.4</b>	165.7	12.9	<b>76.9</b>
Zakarpats'ka obl.	<b>0.9</b>	26.4	4.6	0.2	40.2	33.9	220.3	17.4	16.0
Zaporizhzhya obl.	0.3	36.9	4.1	9.6	<b>422.5</b>	13.3	243.5	<b>31.6</b>	22.0
Ivano-Frankivs'k obl.	<b>0.9</b>	29.5	1.2	8.9	187.7	17.8	<b>412.7</b>	24.5	23.1
Kiev oblast, excluding Kiev city	0.1	29.6	2.7	4.8	<b>241.4</b>	35.8	208.5	20.4	26.7
Kiev	0.2	36.4	<b>12.8</b>	<b>12.3</b>	<b>540.1</b>	<b>69.8</b>	170.8	28.7	29.2
Kirovohrad obl.	0.2	26.7	0.5	3.5	239.0	12.0	262.3	23.9	37.2

Luhans'k obl.	1.7	17.9	0.4	1.0	412.2	22.4	257.5	6.6	6.8
L'viv obl.	0.4	16.4	5.5	5.6	202.5	10.9	431.9	18.5	29.0
Mykolayiv obl.	0.2	42.6	0.7	4.7	404.2	16.3	239.1	36.7	32.4
Odesa obl.	1.1	74.4	9.1	13.3	290.1	9.7	153.1	32.2	31.4
Poltava obl.	0.1	29.2	2.4	8.6	350.8	26.6	363.3	14.9	26.6
Rivne obl.	1.5	49.2	1.8	4.7	212.0	5.9	294.2	11.2	98.5
Sumy obl.	0.2	63.2	0.7	3.9	332.1	52.8	257.3	6.0	20.5
Ternopil' obl.	0.3	25.9	2.1	2.2	127.2	7.1	520.6	18.7	7.8
Kharkiv obl.	0.5	20.1	4.1	4.8	255.7	13.4	184.4	23.3	10.5
Kherson obl.	0.1	46.6	2.8	1.3	311.9	7.5	194.9	28.0	59.3
Khmel'nyts'kyy obl.	0.3	77.8	1.9	2.6	192.8	5.9	213.8	24.8	27.7
Cherkasy obl.	0.3	53.5	0.8	1.9	354.4	19.0	167.2	13.9	35.4
Chernivtsi obl.	-	26.2	1.3	7.7	135.4	3.0	205.9	13.3	17.3
Chernihiv obl.	0.1	55.4	3.1	8.1	236.3	63.2	236.6	16.1	20.7

Active Tuberculosis  
(First Diagnosed Cases)

	Incidence			Per 100,000 Population		
	1985	1990	1992	1985	1990	1992
Ukraine	20987	16465	18140	41.2	31.9	35.0
Respublika Krym	876	642	824	37.6	25.7	31.8
Vinnysya obl.	833	726	713	42.5	38.0	37.6
Volnys'ka obl.	401	308	388	38.1	29.0	36.2
Dnipropetrovs'k obl.	1338	1120	1288	35.4	28.8	32.9
Donets'k obl.	1872	1496	1675	35.7	28.1	31.4
Zhytomyr obl.	1054	622	687	67.3	41.0	45.8
Zakarpats'ka obl.	505	479	433	41.3	38.2	34.1
Zaporizhzhya obl.	913	670	696	44.9	32.1	33.1
Ivano-Frankivs'k obl.	660	500	547	47.6	35.0	37.8
Kiev oblast; excluding Kiev city	829	629	660	42.1	32.4	34.2
Kiev	578	498	734	23.8	19.1	28.0
Kirovohrad obl.	637	478	461	51.6	38.8	37.2
Luhans'k obl.	1169	890	1042	41.4	31.4	36.2
L'viv obl.	1134	870	1030	42.6	31.8	37.4

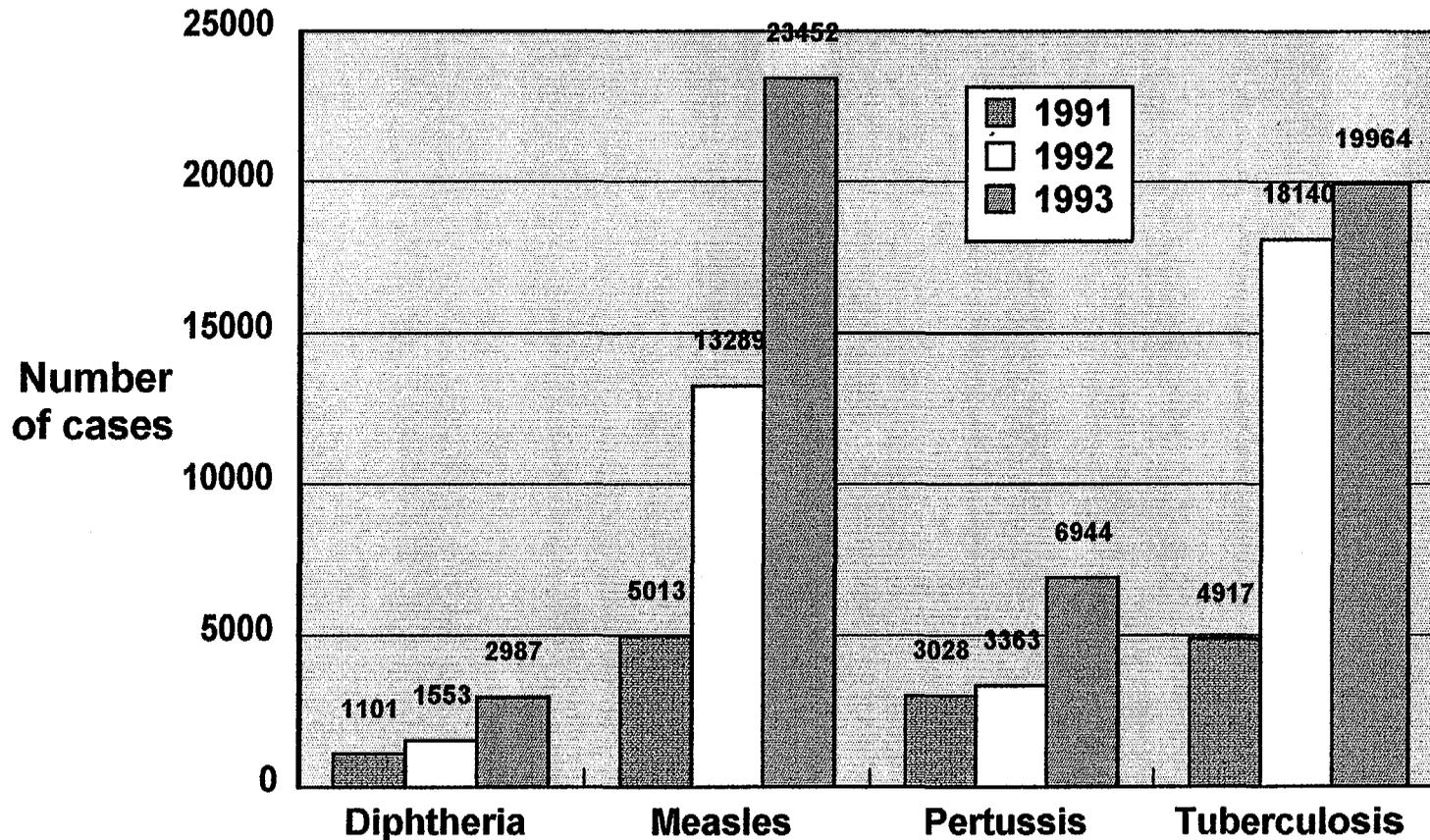
Mykolayiv obl.	606	453	500	46.8	33.9	36.9
Odesa obl.	1335	1091	1098	51.4	41.7	41.9
Poltava obl.	607	495	539	34.7	28.2	30.6
Rivne obl.	539	405	464	46.5	34.6	39.3
Sumy obl.	619	425	496	43.1	29.8	34.8
Ternopil' obl.	517	379	427	44.3	32.4	36.4
Kharkiv obl.	1165	975	1052	37.1	30.7	33.2
Kherson obl.	668	543	582	54.9	43.4	45.7
Khmel'nyts'kyy obl.	579	497	474	37.6	32.8	31.2
Cherkasy obl.	581	490	446	37.8	32.1	29.2
Chernivtsi obl.	353	266	316	38.1	28.3	33.4
Chernihiv obl.	619	509	568	42.9	36.2	40.8

WHO, Global Programme on Vaccines: Incidence  
 (Number of cases)

Republic	Diphtheria		Measles		Neonatal Tetanus		Pertussis		Polio		Total Tetanus		TB	
	'92	'93	'92	'93	'92	'93	'92	'93	'92	'93	'92	'93	'92	'93
Armenia	--	0	--	206	--	--	--	--	1	0	--	--	--	--
Azerbaijan	55	141	--	584	--	--	--	173	22	70	9	--	--	2954
Belarus	66	120	2324	3874	0	0	638	755	0	1	--	6	2936	4134
Estonia	3	11	71	312	0	0	200	280	0	0	1	1	299	532
Georgia	3	28	115	405	--	--	148	267	0	0	3	4	--	--
Kazakhstan	45	82	647	3297	0	0	1117	665	6	1	11	9	10920	9992
Kyrgyzstan	4	6	815	3825	--	--	371	299	5	0	3	0	--	--
Latvia	8	12	248	54	0	--	106	116	0	0	2	1	955	1646
Lithuania	9	8	200	249	0	0	301	254	0	0	3	4	1598	1895
Moldova	22	35	322	863	0	0	526	831	1	1	3	2	1835	1938
Russia	3899	15299	18570	74463	0	--	24046	39439	10	3	85	96	45385	112964
Tajikistan	14	680	2358	5045	--	0	1127	1095	5	14	1	2	1671	652
Turkmenistan	22	3	692	2486	--	0	209	173	4	2	2	--	2074	1061
Ukraine	1553	2987	13289	23452	--	--	3363	6944	12	5	99	83	18140	19964
Uzbekistan	29	137	2020	3353	--	0	--	523	11	68	--	3	--	7227

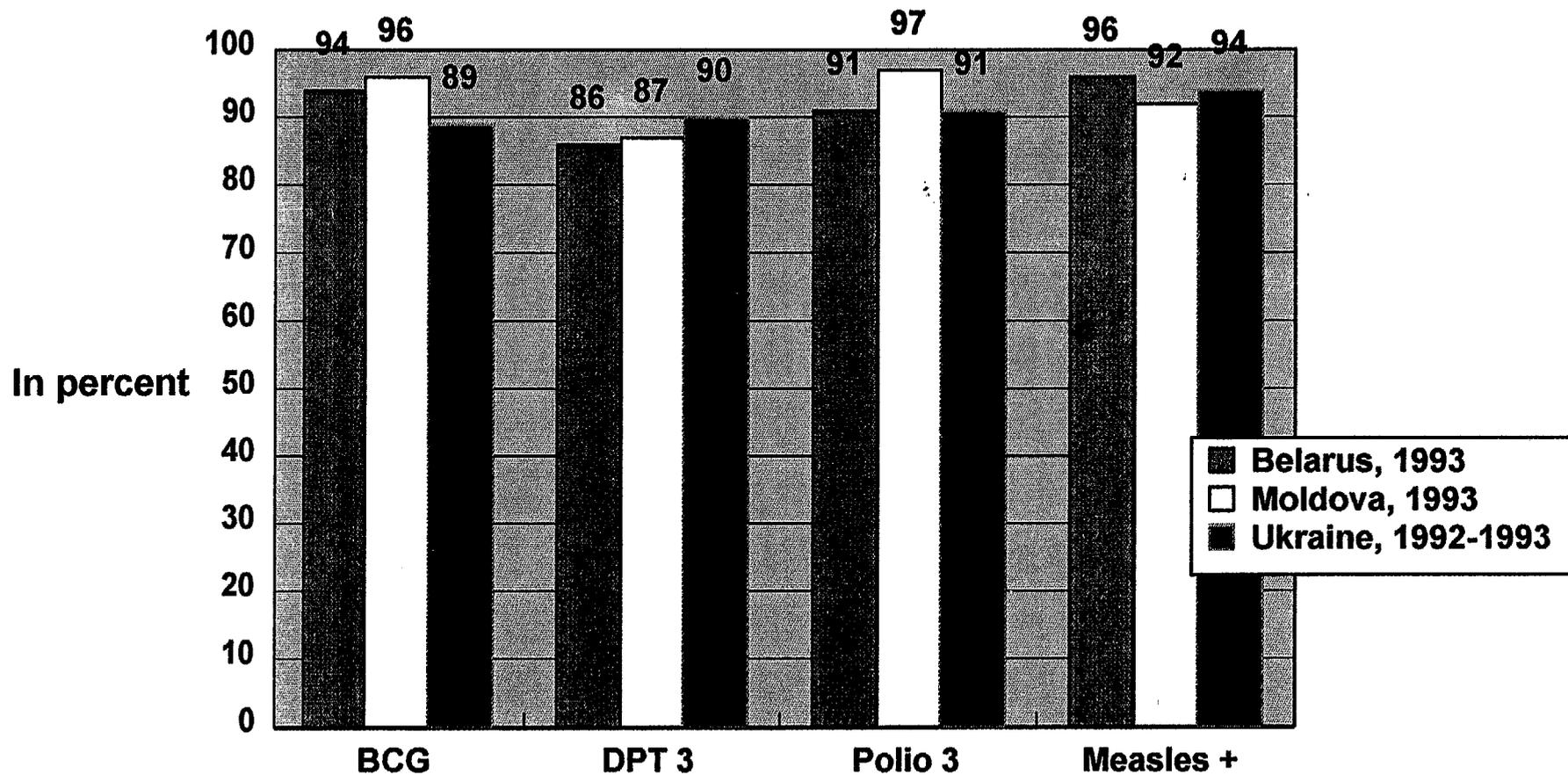
World Health Organization, from WHO Gopher Server, 9 December 1994.

# WHO Global Programme on Vaccines Incidence: Ukraine



Source: WHO Internet Gopher Service, December 1994,  
and UNICEF/WHO Collaborative Mission, February 1992.

# WHO Global Programme on Vaccines Information System: Coverage Ratios



Source: WHO Internet Gopher Service

## Venereal Diseases

(Number of cases)

	Syphilis		Gonorrhhea	
	1990	1992	1990	1992
Ukraine	3087	9776	37777	44465
Respublika Krym	209	797	2572	2974
Vinnysya obl.	37	165	655	684
Volnys'ka obl.	7	91	543	501
Dnipropetrovs'k oblast	362	1014	4006	4964
Donets'k obl.	225	1014	4515	4494
Zhytomyr obl.	57	144	611	780
Zakarpats'ka obl.	34	101	553	619
Zaporizhzhya obl.	171	387	2273	2804
Ivano-Frankivs'k obl.	38	158	623	707
Kiev oblast, excluding Kiev city	67	183	1045	1281
Kiev	302	776	2689	4452
Kirovohrad obl.	191	434	824	859
Luhans'k obl.	98	305	2673	3014
L'viv obl.	185	448	1056	1131

Mykolayiv obl.	48	241	1058	1293
Odesa obl.	276	1379	2547	2582
Poltava obl.	33	127	1391	1803
Rivne obl.	19	111	386	416
Sumy obl.	26	67	1368	1900
Ternopil' obl.	67	72	811	943
Kharkiv obl.	319	686	1658	1601
Kherson obl.	106	328	1177	1057
Khmel'nyts'kyy obl.	78	184	945	1360
Cherkasy obl.	19	139	971	1188
Chernivtsi obl.	89	285	375	478
Chernihiv obl.	24	140	452	580

Venereal Diseases  
(Number per 100,000 population)

	Syphilis		Gonorrhhea	
	1990	1992	1990	1992
Ukraine	6.0	18.8	73.2	85.7
Respublika Krym	8.4	30.8	103.0	114.9
Vinnysya obl.	1.9	8.7	34.3	36.0
Volnys'ka obl.	0.7	8.5	51.1	46.7
Dnipropetrovs'k oblast	9.3	25.9	102.9	126.8
Donets'k obl.	4.2	19.0	84.8	84.2
Zhytomyr obl.	3.8	9.6	40.3	52.0
Zakarpats'ka obl.	2.7	8.0	44.1	48.7
Zaporizhzhya obl.	8.2	18.4	108.9	133.2
Ivano-Frankivs'k obl.	2.7	10.9	43.7	48.9
Kiev oblast;excluding Kiev city	3.5	9.5	53.8	66.3
Kiev	11.6	29.6	103.3	169.8
Kirovohrad obl.	15.5	35.1	66.9	69.4
Luhans'k obl.	3.4	10.6	93.4	104.8
L'viv obl.	6.8	16.3	38.6	41.1

Mykolayiv obl.	3.6	17.8	79.1	95.5
Odesa obl.	10.5	52.7	97.3	98.6
Poltava obl.	1.9	7.2	79.4	102.3
Rivne obl.	1.6	9.4	33.0	35.3
Sumy obl.	1.8	4.7	96.0	133.2
Ternopil' obl.	5.7	6.1	69.4	80.3
Kharkiv obl.	10.0	21.7	52.2	50.6
Kherson obl.	8.5	25.8	94.1	83.1
Khmel'nyts'kyy obl.	5.1	12.1	62.3	89.5
Cherkasy obl.	1.2	9.1	63.6	77.7
Chernivtsi obl.	9.5	30.1	39.8	50.5
Chernihiv obl.	1.7	10.1	32.1	41.6

## Drug and Toxic Substance Abuse

(First Diagnosed Cases)

	Incidence			Per 100,000 Population		
	1985	1990	1992	1985	1990	1992
Ukraine	4617	3417	5046	9.1	6.6	9.7
Respublika Krym	137	158	205	5.9	6.3	7.9
Vinnysya obl.	24	31	83	1.2	1.6	4.4
Volnys'ka obl.	27	18	56	2.6	1.7	5.2
Dnipropetrovs'k oblast	2018	897	981	53.4	23.0	25.1
Donets'k obl.	674	583	809	12.8	10.9	15.2
Zhytomyr obl.	36	54	77	2.3	3.6	5.1
Zakarpats'ka obl.	7	4	6	0.6	0.3	0.5
Zaporizhzhya obl.	43	233	381	2.1	11.2	18.1
Ivano-Frankivs'k obl.	26	51	77	1.9	3.6	5.3
Kiev oblast;excluding Kiev city	37	77	125	1.9	4.0	6.5
Kiev	83	94	138	3.4	3.6	5.3
Kirovohrad obl.	33	56	82	2.7	4.5	6.6
Luhans'k obl.	15	88	92	0.5	3.1	3.2

L'viv obl.	93	57	177	3.5	2.1	6.4
Mykolayiv obl.	423	109	145	32.7	8.1	10.7
Odesa obl.	486	287	528	18.7	10.9	20.2
Poltava obl.	87	59	129	5.0	3.4	7.3
Rivne obl.	18	20	78	1.6	1.7	6.6
Sumy obl.	6	25	50	0.4	1.7	3.5
Ternopil' obl.	8	23	43	0.7	2.0	3.7
Kharkiv obl.	67	207	305	2.1	6.5	9.6
Kherson obl.	116	41	94	9.5	3.3	7.4
Khmel'nyts'kyi obl.	61	62	101	3.9	4.1	6.6
Cherkasy obl.	49	90	92	3.2	5.3	6.0
Chernivtsi obl.	13	9	41	1.4	0.9	4.3
Chernihiv obl.	30	84	151	2.1	6.0	10.8

Dumping of Polluted Wastewater into Natural Surface Water Bodies

(By Oblast and the Crimean Republic; In millions of cubic meters)

	1985		1990		1993	
	Total	Untreated	Total	Untreated	Total	Untreated
Ukraine	1300.0	212.6	3198.6	470.2	4651.8	1196.2
Respublika Krym	31.1	12.7	101.4	6.4	133.9	6.5
of which, Sevastopol	12.0	3.4	5.3	3.7	55.0	4.4
Vinnitsya obl.	10.4	0.6	32.2	4.6	13.4	3.5
Volnys'ka obl.	2.0	1.2	24.2	-	25.0	-
Dnipropetrovs'k oblast	460.6	78.2	849.0	238.2	831.6	220.4
Donets'k obl.	103.0	3.0	431.6	30.2	1031.6	233.5
Zhytomyr obl.	42.8	3.8	62.9	2.9	58.6	0.2
Zakarpats'ka obl.	5.0	2.5	29.3	2.0	24.0	0.8
Zaporizhzhya obl.	174.0	53.1	167.9	61.5	357.0	108.1
Ivano-Frankivs'k obl.	37.0	4.8	72.1	7.2	84.7	6.4
Kiev oblast,	12.0	0.1	238.0	0.4	61.1	43.8
of which Kiev city	2.2	-	214.5	0.4	44.5	43.8
Kirovohrad obl.	20.1	0.1	37.5	0.1	36.4	0.2
Luhans'k obl.	102.0	0.4	257.4	43.5	717.1	178.2
L'viv obl.	23.2	23.0	76.6	4.2	53.4	2.9

Mykolayiv obl.	25.2	3.3	75.0	4.5	84.3	15.6
Odesa obl.	154.6	6.2	133.7	2.6	306.5	160.8
Poltava obl.	8.0	2.9	6.7	0.3	44.6	0.5
Rivne obl.	1.6	0.2	39.1	0.2	32.8	0.1
Sumy obl.	46.0	0.6	58.7	0.7	37.4	0.4
Ternopil' obl.	5.0	2.6	9.4	2.2	9.9	2.1
Kharkiv obl.	17.0	11.8	338.9	5.9	395.5	28.6
Kherson obl.	4.1	0.9	44.4	41.4	180.1	171.9
Khmel'nyts'kyy obl.	7.4	0.3	7.0	0.1	16.6	0.1
Cherkasy obl.	3.1	-	58.9	9.4	33.5	7.1
Chernivtsi obl.	1.7	0.2	39.5	0.4	34.8	4.5
Chernihiv obl.	3.1	0.1	7.2	1.3	48.0	-

## Total Pollutants Emitted, by City: 1993

City	Total pollutants (tons)	Population, thous.	Tons per 1000 population
Antratsyt	8.0	72	111
Alchevs'k	112.2	129	870
Berdyans'k	4.7	137	34
Bila Tserkva	12.3	213	58
Vinnytsya	7.0	387	18
Gorlivka	145.4	336	433
Dzerzhyns'k	38.5	51	755
Donetsk	94.2	1121	84
Dniprodzerzhyns'k	146.3	287	510
Dnipropetrovsk	231.1	1186	195
Drogobych	20.3	79	257
Druzhkivka	12.0	74	162
Evpatoriya	0.6	115	5
Enakyeve	218.1	120	1818
Zhytomyr	6.3	302	21
Zaporyzhzhya	176.8	900	196
Ivano-Frankivs'k	4.1	234	18

Iemail	4.2	94	45
Kerch	153.0	183	836
Kirovograd	8.4	281	30
Konotop	5.8	100	58
Kostyantynivka	15.7	106	148
Kramators'k	16.9	204	82
Krasniy Luch	135.1	115	1175
Kremenchuk	117.3	248	473
Kryvyy Rig	697.6	737	947
Kiev	73.5	2646	28
Lysychans'k	71.7	127	565
Lugans'k	155.0	504	308
Luts'k	3.4	217	16
L'viv	9.1	810	11
Makiivka	178.5	424	421
Mariupol'	404.1	524	771
Marganets'	4.0	55	73
Melitopol'	9.9	178	56
Mikolaiv	21.8	519	42
Nikopol'	43.0	161	267
Novomoskovs'k	0.9	76	12

Odesa	35.3	1087	32
Pervomais'k	12.7	83	153
Poltava	8.1	326	25
Rivne	7.1	245	29
Rubizhne	7.3	75	97
Sevastopol'	11.9	375	32
Severodonets'k	7.5	135	56
Simferopol'	6.8	358	19
Slov'yans'k	62.6	138	454
Stakhanov	73.8	114	647
Sumy	13.4	307	44
Ternopil'	4.1	229	18
Uzhgorod	1.2	126	10
Kharkiv	46.5	1615	29
Kherson	30.6	371	82
Khmel'nyts'kyy	6.1	253	24
Cherkasy	28.2	312	90
Chernivtsi	5.1	263	19
Chernigiv	24.0	313	77
Shakhtars'k	18.6	73	255
Shostka	7.4	94	79
Yalta	1.8	89	20

Figure 1.--TYPHOID AND PARATYPHOID A, B, C, PER 100,000  
POPULATION: 1992

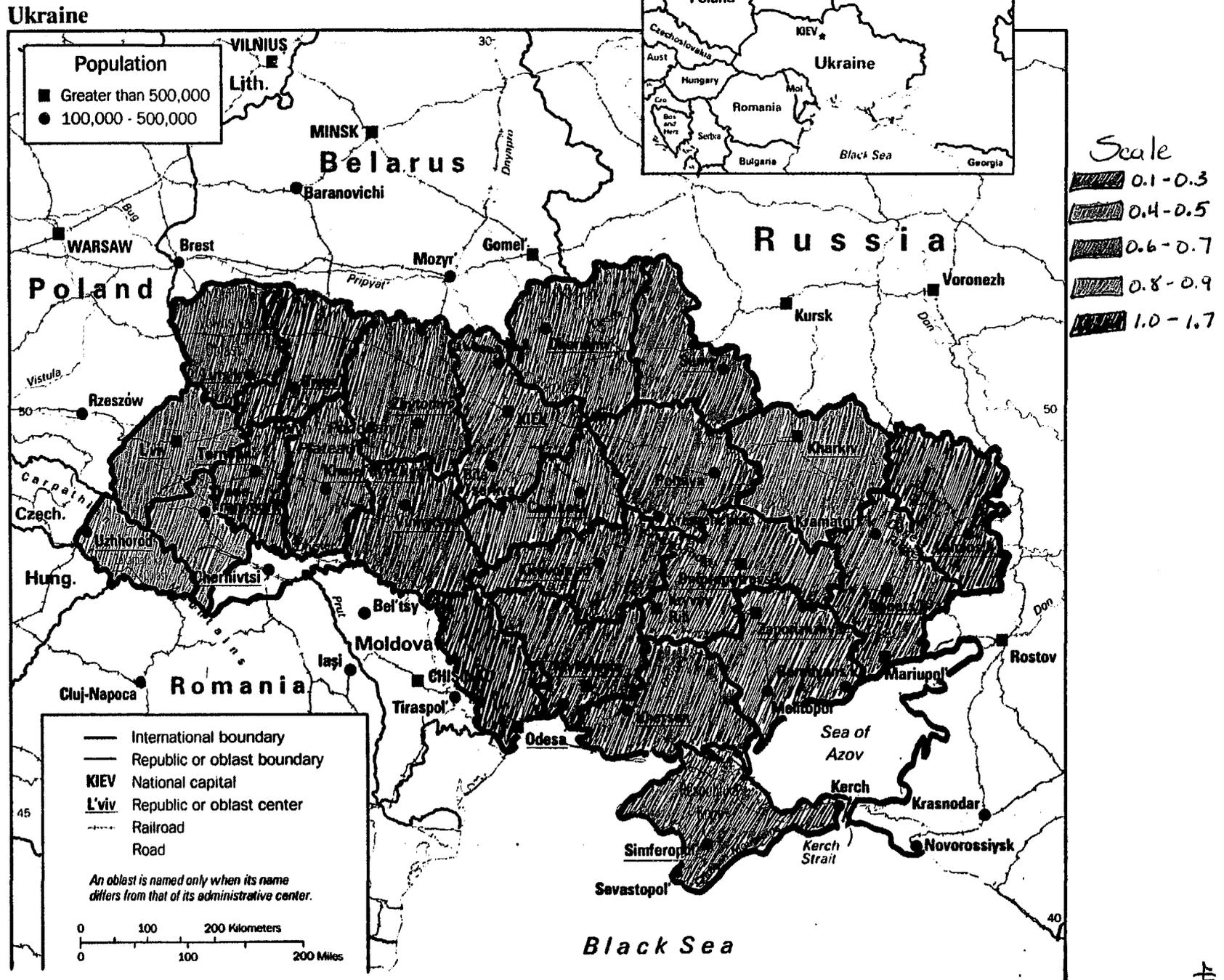


Figure 2.--MEASLES, PER 100,000 POPULATION: 1992



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Figure 5.--DIPHTHERIA, PER 100,000 POPULATION: 1992

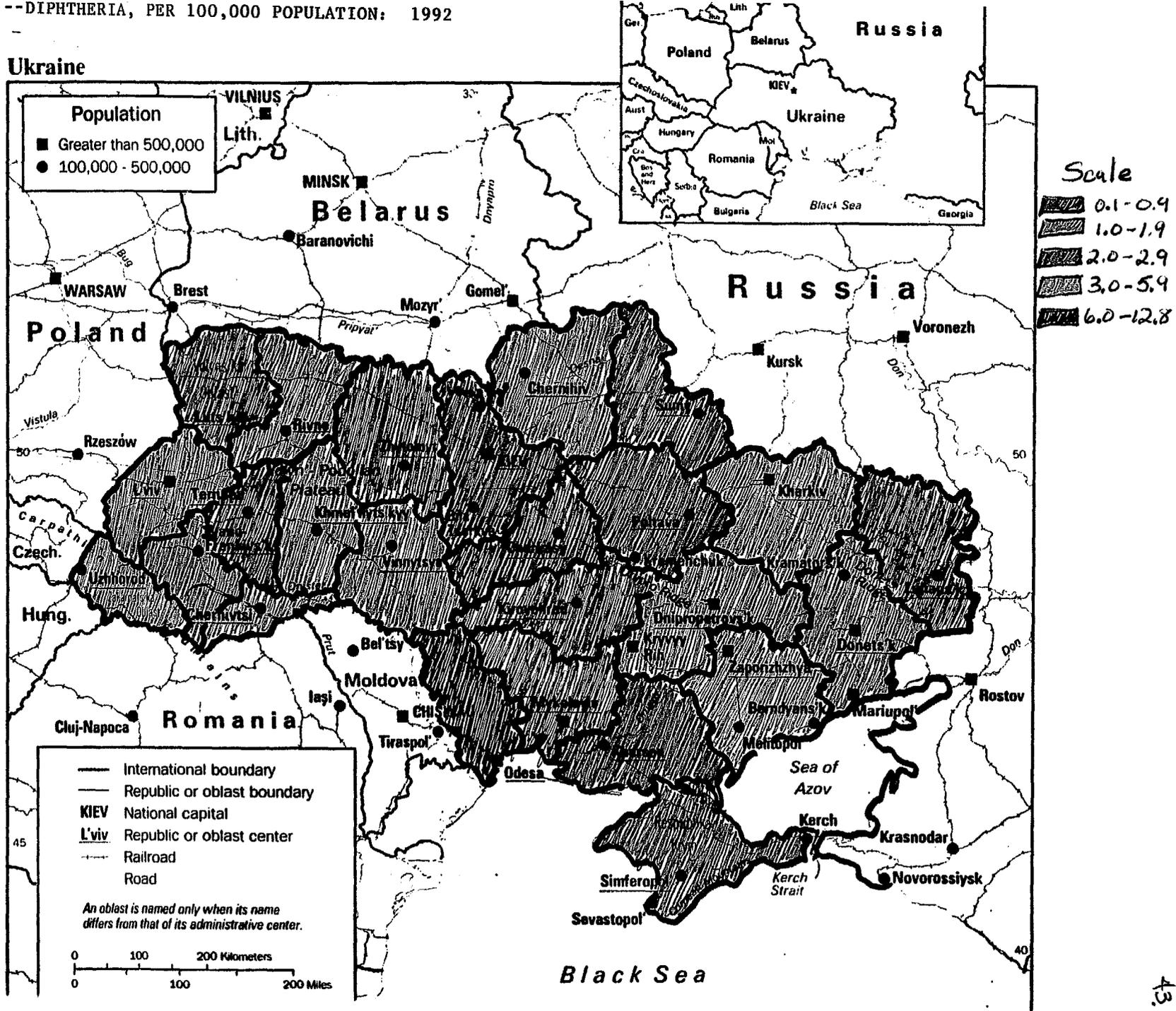




Figure 6. --SYPHILLIS, FIRST DIAGNOSED CASES, PER 100,000

POPULATION: 1992

Ukraine



Previous map data

Ukraine



Ukraine



Handwritten mark

Ukraine

