COMMENTS ON THE REPORTED STATISTICS ON NARCOTIC DRUGS

Summary

The analysis contained in this section of the technical publication is based on the statistical data furnished by Governments.

The demand for natural alkaloids that are obtained from the opium poppy plant (morphine, codeine, thebaine and oripavine) continued to be high in 2009, in line with the trend of the preceding 20 years. About 84 per cent of the morphine and 95 per cent of the thebaine manufactured worldwide were obtained from poppy straw, while the remainder was extracted from opium. Australia, France, Spain and Turkey continued to be the main producer countries in 2009, together accounting for about 88 per cent of global production of poppy straw rich in morphine. Australia, France and Spain were the only producers of poppy straw rich in thebaine in 2009. India remained the sole licit supplier of opium to the world market.

Manufacture of morphine followed a rising trend over the past two decades, reaching a record level of 440 tons in 2007; in 2009, it stood at 411 tons. Manufacture of thebaine increased sharply since the late 1990s and reached an all-time high of 148 tons in 2009. Manufacture of codeine stood at 340 tons in 2009, a level close to the record high of 349 tons in 2007. Morphine and codeine are used in therapy and for conversion into other opioids. Thebaine itself is not used in therapy, but it is an important starting material for the manufacture of a number of opioids. Australia, France, the United Kingdom of Great Britain and Northern Ireland and the United States of America continued to be the leading manufacturers of natural alkaloids.

Codeine has been the most commonly consumed opiate in the world, in terms of doses and the number of countries in which it is consumed. Its use reached an all-time high in 2009 (254 tons). Global consumption of morphine for the treatment of severe pain rose by a factor of almost six over the past two decades, reaching a record high of 41.8 tons in 2009. That increase is due mainly to increased consumption in high-income countries, while, unfortunately, consumption levels in most other countries remained very low. Australia, Canada, Japan, New Zealand, the United States and countries in Europe accounted for more than 93 per cent of total morphine consumption in 2009.

Among the semi-synthetic opioids obtained from natural alkaloids, hydrocodone has been the drug with the highest consumption in terms of doses consumed. Global consumption of hydrocodone amounted to 39.1 tons in 2009. Global consumption of oxycodone and hydromorphone continued to follow a sharp upward trend in 2009 (77 tons and 3.7 tons respectively). As in the past, the United States was the principal consumer country of those three opioids. The use of dihydrocodeine (30.7 tons in 2009) and pholcodine (9.0 tons in 2009) was relatively stable in recent years, although with fluctuations from year to year. In a reversal of the previous trend, the use of ethylmorphine increased during the past two years, reaching 1.6 tons in 2009.

Among the synthetic opioids, consumption of fentanyl has followed an increasing trend, reaching 1.4 tons in 2009, a slight decline from the all-time high of 1.5 tons in 2008. Fentanyl has been the synthetic opioid with the highest consumption in terms of doses consumed. Consumption of methadone also followed a steadily rising trend, reaching a record level of 31.8 tons in 2009. Consumption of tilidine (24.7 tons in 2009) has increased steadily over the past 20 years, from 1990 to 2009, albeit with fluctuations from year to year. Diphenoxylate consumption also increased in recent years, reaching a new all-time high in 2009 (18.3 tons). Global use of dextropropoxyphene (259 tons in 2009) and pethidine (9.9 tons in 2009) has showed a downward trend.

1. The present comments are intended to facilitate the use of the statistical information on the licit production, manufacture, consumption,[1] utilization[2] and stocks of, as well as trade in, opiate raw materials, the main opioids, including synthetic narcotic drugs under international control, and cannabis, coca leaf and cocaine that is presented in the tables of reported statistics (see pages 167-329 below). References to those tables are contained in the text, as appropriate. Unless otherwise indicated, the comments refer to developments during the period 1990-2009.

2. The tables of reported statistics contain data furnished by Governments to the International Narcotics Control Board (INCB) in accordance with article 20 of the Single Convention on Narcotic Drugs of 1961.[3] The most recent statistical data reflected in the comments are those relating to the year 2009. The failure by some Governments to submit reports or to provide precise and complete reports may have a bearing on the accuracy of some of the information presented below.[4] The most pertinent conclusions and recommendations of INCB based on the analysis of statistical data are included in chapter II of its annual report.[5]

[1]For the purposes of the Single Convention on Narcotic Drugs of 1961, a drug is regarded as "consumed" when it has been supplied to any person or enterprise for retail distribution, medical use or scientific research; and "consumption" is construed accordingly (art. 1, para. 2).

[2]The parties shall furnish INCB with statistical returns on the utilization of narcotic drugs for the manufacture of other drugs, of preparations in Schedule III of the 1961 Convention and of substances not covered by the Convention and on the utilization of poppy straw for the manufacture of drugs.

[3]United Nations, *Treaty Series*, vol. 520, No. 7515.

[4]Details on the submission of statistical reports by individual Governments are contained in part two of this publication.

[5]*Report of the International Narcotics Control Board for 2010* (United Nations publication, Sales No. E.11.XI.1).

Opiate raw materials

3. Opium and poppy straw are the raw materials obtained from the opium poppy plant (*Papaver somniferum*), from which alkaloids such as morphine, thebaine, codeine and oripavine are extracted. Concentrate of poppy straw is a product obtained in the process of extracting alkaloids from poppy straw. It is controlled under the 1961 Convention.

4. The demand for alkaloids increased significantly over the 20-year period from 1990 to 2009. Throughout the period, the increased demand was covered mainly by poppy straw. In 2009, approximately 84 per cent of the morphine and about 95 per cent of the thebaine manufactured worldwide were obtained from poppy straw, while the rest was obtained from opium.

5. Details on trends in the production and use of opium and poppy straw, and on the manufacture and use of the principal opiates,[6] including concentrate of poppy straw, are provided below. The current balance between the supply of opiate raw materials and the demand for opiates for medical and scientific needs is examined in a separate section of the present publication (see pages 94-101 below).

Opium

6. Opium (also called "raw opium") is the latex obtained by making incisions on the green capsules of opium poppy plants. For statistical and comparison purposes, data on the production of and trade in opium are reported at 10-per-cent moisture content. When appropriate, the data on opium are also expressed in morphine equivalent,[7] in order to enable comparison between opium and poppy straw. Figure 1 shows the licit production, stocks and use (consumption plus utilization) of opium during the period 1990-2009, expressed in morphine equivalent. Not included in the data on stocks and use are the amounts of illicitly produced opium that were seized and released for licit purposes (see paragraph 10 below).

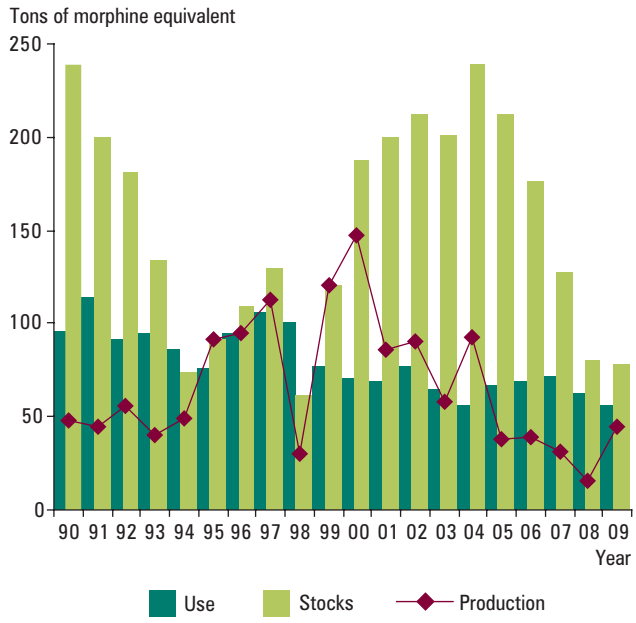
7. India has been the leading licit producer of opium for several decades, accounting for over 90 per cent of global production. Other opium-producing countries are China,[8] the Democratic People's Republic of Korea and Japan (see table I). After 2000, production declined, with some fluctuations, totalling 144 tons (or 16 tons in morphine equivalent) in 2008. In 2009, it increased to 407 tons (or 45 tons in morphine equivalent), of which 97 per cent was produced in India. In China, opium is produced for opium preparations for domestic use, while poppy straw has replaced opium as the main raw material for the manufacture of alkaloids. In 2009, China produced 10.7 tons of opium and the Democratic People's Republic of Korea produced 449 kg of opium.

[6]"Opiate" is the term generally used to designate drugs derived from opium and their chemically related derivatives, such as the semi-synthetic alkaloids.

[7]The morphine or thebaine equivalent is calculated by the International Narcotics Control Board on the basis of the industrial yield of the respective alkaloid obtained from opium or poppy straw. Lesser alkaloids contained in opium or poppy straw that are convertible into morphine or thebaine have also been included, adjusted by appropriate conversion rates, whenever the Board has been informed of their extraction in commercially significant quantities.

[8]Data for China do not include statistics relating to the Hong Kong Special Administrative Region of China, the Macao Special Administrative Region of China or Taiwan Province of China.

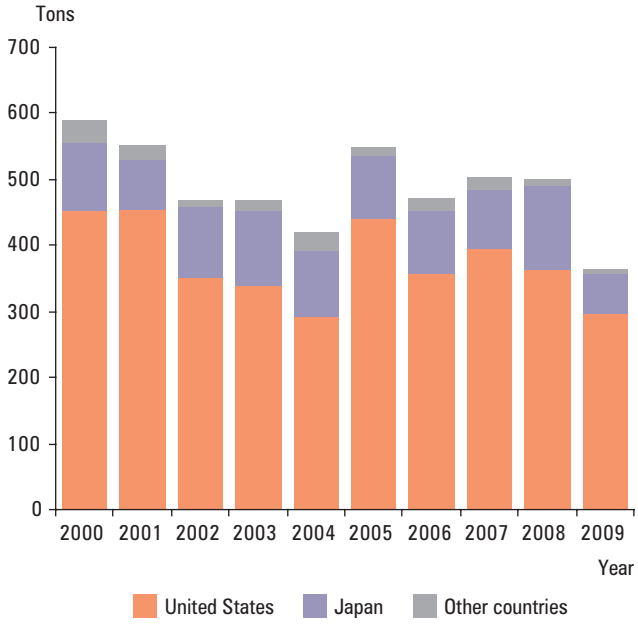
Figure 1. Opium: global production, stocks[a] and use (consumption and utilization), in morphine equivalent, 1990-2009



[a]Stocks as at 31 December.

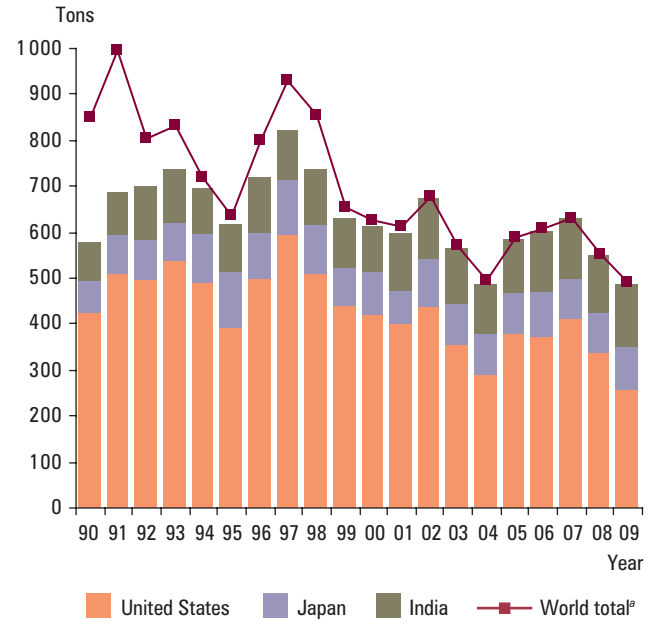
8. India is the only licit supplier of opium to the world market, and most of the opium produced in India is destined for export. Opium exported from India contains morphine in a concentration of 9.5-12.0 per cent, codeine of about 2.5 per cent and thebaine of 1.0-1.5 per cent. As shown in figure 2, imports from India had fluctuated in recent years and decreased to about 360 tons (or 40 tons in morphine equivalent) in 2009. The United States and Japan continued to be the main importing countries, accounting for 82 per cent and 17 per cent of total imports in 2009 respectively.

Figure 2. Opium: imports from India, 2000-2009



9. The bulk of opium is used for the extraction of alkaloids. Total utilization of licitly produced opium for the extraction of alkaloids fluctuated during the period under consideration (see figure 3), dropping to 491 tons (or 54 tons in morphine equivalent) in 2009. The United States, India and Japan, in descending order, were the main users of opium for the extraction of alkaloids during the 10 years prior to 2009, together accounting for almost the entire global total in 2009. Details on the utilization of opium for the extraction of alkaloids and the alkaloids obtained are provided in table III.

Figure 3. Opium: utilization for the extraction of alkaloids, 1990-2009



[a]Excluding Iran (Islamic Republic of), Myanmar and Turkey.

10. In the Islamic Republic of Iran, seized opium is released in large quantities for the extraction of alkaloids. The quantities released for such purposes stood at 211 tons in 2007, but dropped to a lower level thereafter, reaching 91 tons in 2009. The yield of alkaloids extracted from seized opium is usually less than from licitly produced opium.[9] The alkaloids obtained from seized opium are destined for domestic use.

11. In addition to being used for the extraction of alkaloids, opium is also consumed in many countries in the

[9]For the yields obtained in countries that extract alkaloids from opium, see table III.

form of preparations, mainly for the treatment of diarrhoea and coughs. Most of those preparations are included in Schedule III of the 1961 Convention.[10] Global consumption of opium has fluctuated, averaging around 16.5 tons per year since 2001. Total consumption in 2009 was 17.7 tons, which corresponds to 177 million defined daily doses for statistical purposes (S-DDD).[11] In 2009, consumption and use of opium for the manufacture of preparations in Schedule III amounted to 7 tons in China, 3.8 tons in India and 2.9 tons in France.

12. Global stocks of opium reached their peak of the last decade in 2004 (2,176 tons) and then began to decrease. In 2009, they stood at 709 tons (or 78 tons of morphine equivalent). India continued to hold the largest stocks (463 tons, or 65 per cent of the global total), followed by Japan (106 tons), the United States (84.1 tons), China (35.6 tons) and the United Kingdom (16.3 tons).[12]

Poppy straw

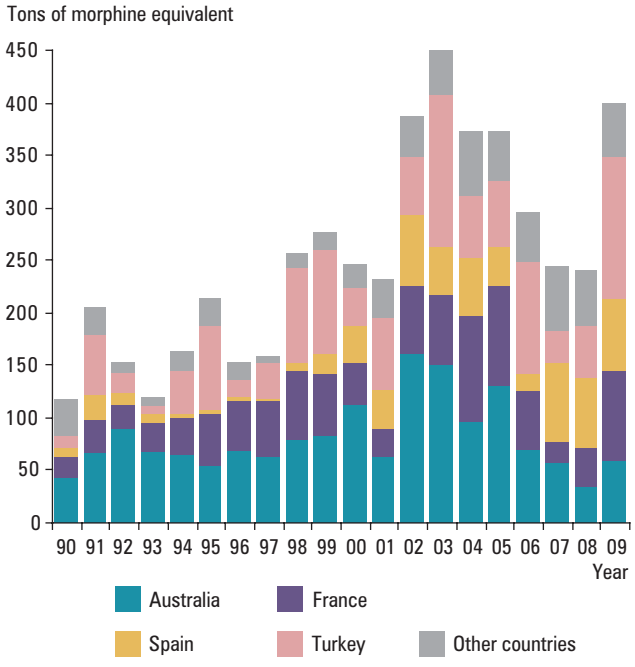
13. Poppy straw consists of all parts of the opium poppy plant after mowing except the seeds. Morphine is the predominant alkaloid found in the varieties of opium poppy plant cultivated in most producing countries. However, the opium poppy plant with high thebaine content, commercial cultivation of which started in the second half of the 1990s, is increasingly in demand. In the present publication, poppy straw produced from varieties of opium poppy plant rich in morphine is referred to as "poppy straw (M)", and poppy straw produced from varieties of opium poppy plant rich in thebaine is referred to as "poppy straw (T)". Some of those varieties contain, in addition to the main alkaloid (morphine or thebaine), other alkaloids that can be extracted, such as codeine and oripavine.

14. The concentration of alkaloids in poppy straw varies significantly among the producing countries.[13] Production levels of poppy straw among those countries can be compared only by use of a common denominator, which is the morphine or thebaine equivalent of the quantity of poppy straw produced in each country.

Poppy straw produced from opium poppy rich in morphine (poppy straw (M))

15. Although submission of statistics on the production of poppy straw is voluntary, the countries cultivating opium poppy plants for the extraction of alkaloids provide such information. Global production of poppy straw (M) expressed in morphine equivalent fluctuated widely in the two decades prior to 2009, mainly because of weather conditions and in response to the demand in producer countries. Production reached its highest level to date in 2003, at about 450 tons in morphine equivalent, and then declined to a level of about 240 tons in 2008. Production increased strongly in 2009 to about 400 tons (see figure 4).[14] Throughout the decade prior to 2009, Australia, France, Spain and Turkey were the main producer countries. In 2009, the leading producer was Turkey (134 tons, accounting for 34 per cent of global production), followed by France (84 tons, or 21 per cent), Spain (70 tons, or 18 per cent) and Australia (60 tons, or 15 per cent). Together, those four countries accounted for about 88 per cent of global production. Other main producers of poppy straw (M) in 2009 were China and the United Kingdom, together accounting for about 9 per cent of global production in morphine equivalent.

Figure 4. Poppy straw (M): production, in morphine equivalent, 1990-2009



[10]Preparations included in Schedule III of the 1961 Convention are exempt from several control measures that are otherwise mandatory for preparations containing narcotic drugs, including reporting on their consumption and international trade.

[11]The list of defined daily doses for statistical purposes and an explanation of that concept are contained in the notes to table XIV.1.

[12]For production of, stocks of and demand for opium, see also the section entitled "Supply of opiate raw materials and demand for opiates for medical and scientific purposes", on page 94.

[13]For example, in the period 2007-2009, the industrial yield of anhydrous morphine alkaloid obtained from poppy straw (M) during the manufacture of anhydrous morphine alkaloid contained in concentrate of poppy straw (AMA (CPS)) averaged 1.41 per cent in Australia, 1.3 per cent in France and Spain and 0.39 per cent in Turkey.

[14]The morphine equivalent of the morphine and codeine alkaloids contained in poppy straw (T) is also included, where appropriate, in the data in this paragraph.

16. In 2009, production of poppy straw (M) increased significantly in Australia, France and Turkey and grew also in Spain, owing to an expansion in the areas used for the cultivation of opium poppy for the production of poppy straw. Changes in the area cultivated with the opium poppy plant, the amounts of poppy straw (M) harvested and the yields obtained in producing countries are shown in table II.

17. International trade in poppy straw (M) as a raw material continues to be limited, with the Czech Republic being the only major exporter of poppy straw for the purpose of extraction of alkaloids (see table XVI.1). The Czech Republic, which cultivates opium poppy plants primarily for the production of seeds, produces poppy straw as a by-product and exports it to Slovakia, where it is used for the extraction of alkaloids. Such poppy straw has a significantly lower morphine content than poppy straw obtained from opium poppy plants cultivated for the production of alkaloids. In 2009, imports by Slovakia of poppy straw (M) from the Czech Republic increased to 2,851 tons.

18. In 2009, utilization of poppy straw (M) in the main user countries amounted to 25,095 tons in Turkey, 5,416 tons in Australia, 5,099 tons in France and 4,068 tons in Spain. Further details on the utilization of poppy straw (M) for the extraction of alkaloids and the yields obtained are contained in table IV.

Poppy straw produced from opium poppy rich in thebaine (poppy straw (T))

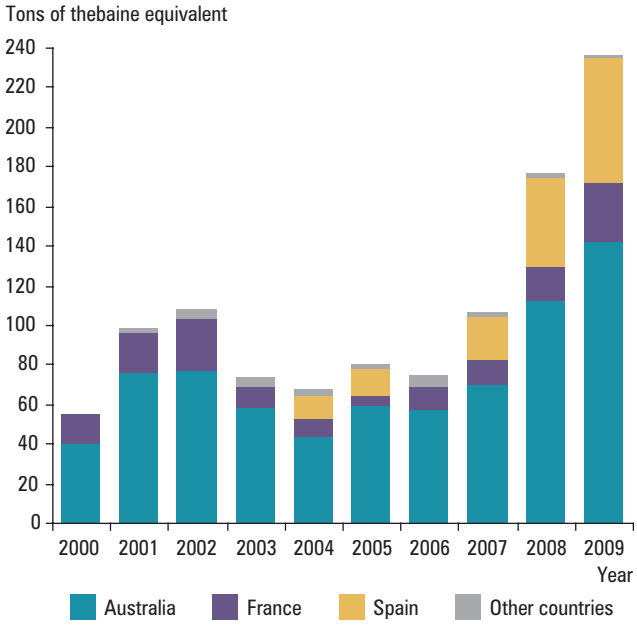
19. Australia and France started to report to INCB the production of poppy straw (T) in 1999. Spain reported the production of poppy straw (T) for the first time in 2004. China has reported sporadic production in recent years. More details on the production of poppy straw (T) can be found in table II.

20. Global production of poppy straw (T) expressed in thebaine equivalent during the period 2000-2009 is shown in figure 5. In 2009, total production amounted to about 236 tons.[15] Australia remained the leading producer (142 tons in thebaine equivalent, accounting for 60 per cent of global production). It was followed by Spain (63 tons, or 27 per cent) and France (30 tons, or 13 per cent).

21. All poppy straw (T) is used in the producing countries for the extraction of alkaloids. The quantities used, the alkaloids obtained from poppy straw (T) and the respective yields are shown in table V.

[15]The thebaine equivalent of the thebaine and oripavine alkaloids contained in poppy straw (M) is also included, where appropriate, in the data referred to in this paragraph.

Figure 5. Poppy straw (T): production, in thebaine equivalent, 2000-2009



Poppy straw used for decorative purposes

22. In some countries, poppy straw is used for decorative purposes. Austria, Germany and Hungary were the main exporters of poppy straw for such purposes in 2009. The main importers in 2009 were Germany and Switzerland.

Concentrate of poppy straw

23. Most countries using poppy straw for the extraction of alkaloids first manufacture an intermediate product called "concentrate of poppy straw", although in some countries morphine or thebaine are manufactured directly from poppy straw in a continuous process, which may involve a number of other intermediate products (for details, see tables IV and V). Until the second half of the 1990s, only concentrate of poppy straw containing morphine as the main alkaloid was manufactured. Since then, concentrate of poppy straw containing mainly thebaine or oripavine has started to be manufactured. Concentrate of poppy straw may contain a mixture of alkaloids, and more alkaloids than just the principal alkaloid may be extracted in industrial processes. The different types of concentrate of poppy straw are referred to by the main alkaloid contained in them.[16]

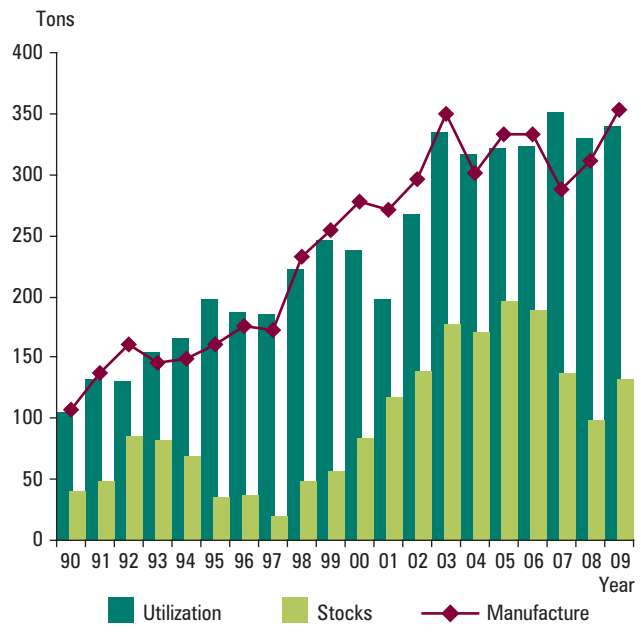
[16]Currently the following types are traded: *(a)* concentrate of poppy straw containing morphine as the main alkaloid; *(b)* concentrate of poppy straw containing thebaine as the main alkaloid; and *(c)* concentrate of poppy straw containing oripavine as the main alkaloid.

24. Since the actual content of alkaloids in concentrate of poppy straw may vary significantly, for purposes of comparison and for statistical purposes all data referring to concentrate of poppy straw are expressed in terms of the quantity of the respective anhydrous alkaloid contained in the material. The quantities of anhydrous morphine alkaloid contained in concentrate of poppy straw are referred to as AMA (CPS), those of anhydrous thebaine alkaloid as ATA (CPS), those of anhydrous oripavine alkaloid as AOA (CPS) and those of anhydrous codeine alkaloid as ACA (CPS). The totals of all the individual alkaloids contained in concentrate of poppy straw are examined below, expressed in terms of 100 per cent of the respective anhydrous alkaloid content.[17]

Anhydrous morphine alkaloid contained in concentrate of poppy straw (AMA (CPS))

25. AMA (CPS) continues to be the most important and most widely used alkaloid among the alkaloids contained in concentrate of poppy straw. Figure 6 shows the trends in its manufacture, stocks and utilization during the 20-year period from 1990 to 2009.

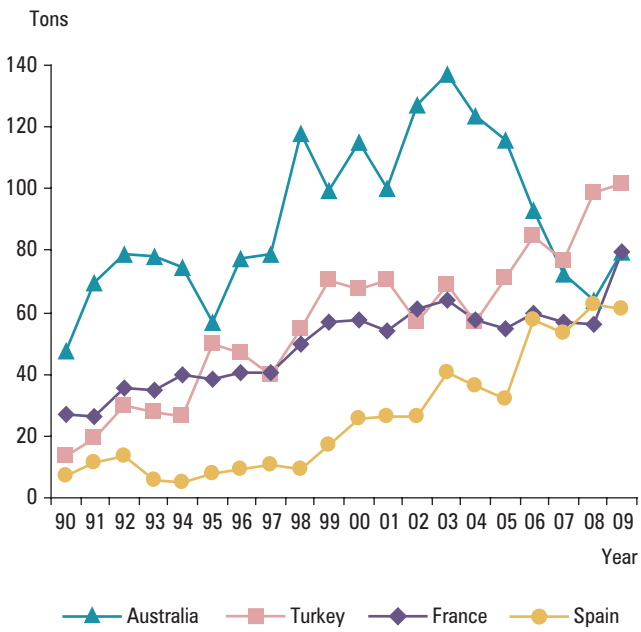
Figure 6. Anhydrous morphine alkaloid contained in concentrate of poppy straw: global manufacture, stocks[a] and utilization, 1990-2009



[a]Stocks as at 31 December.

26. Global manufacture of AMA (CPS) has risen sharply since the 1990s and fluctuated after 2003. Following two years of increase, manufacture reached 353 tons in 2009. Trends in the manufacture of AMA (CPS) in the main manufacturing countries in the period 1990-2009 are presented in figure 7. While Australia had been the leading manufacturer prior to 2007, Turkey became the leading manufacturer in 2007 and has maintained that position. In 2009, Turkey accounted for 102 tons, or 29 per cent of the global total. It was followed by France (79.4 tons, or 23 per cent of global manufacture), Australia (79.2 tons, or 22 per cent) and Spain (60.8 tons, or 17 per cent). Other countries reporting manufacture of AMA (CPS) for 2009 were China (24.1 tons), the United Kingdom (7.5 tons) and the former Yugoslav Republic of Macedonia (181 kg).

Figure 7. Anhydrous morphine alkaloid contained in concentrate of poppy straw: manufacture in the main manufacturing countries, 1990-2009



27. Global exports of AMA (CPS) increased to 240 tons in 2003 and have fluctuated since then. In 2009, they amounted to 202 tons. Turkey remained the main exporting country in 2009 (with 93.9 tons, accounting for 47 per cent of global exports), followed by Spain (66.6 tons, or 33 per cent of global exports) and Australia (32.6 tons, or 16 per cent of global exports). The United States and the United Kingdom[18] have been the leading importers of AMA (CPS), together accounting for 85 per cent of the world total in 2009. Other importing countries were, in descending order,

[17]The comments on concentrate of poppy straw in this publication are not directly comparable with comments on concentrate of poppy straw contained in editions of this publication prior to 2005, since at that time concentrate of poppy straw was expressed at 50 per cent of the main alkaloid contained therein.

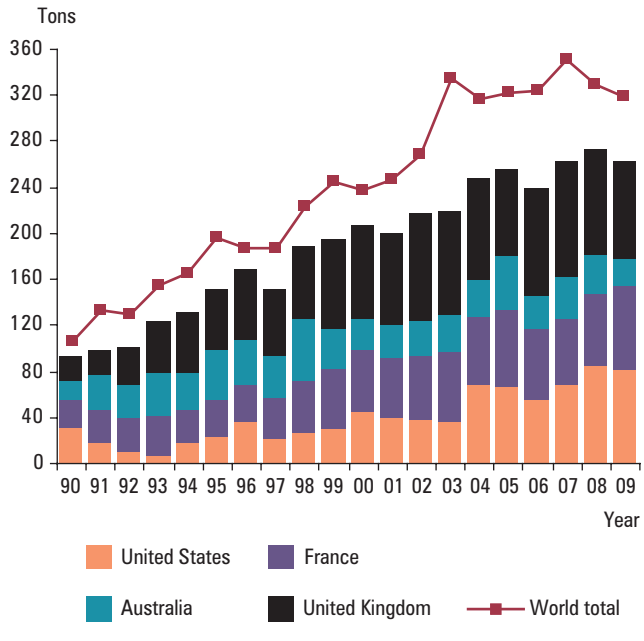
[18]The figure for the United Kingdom is based on data reported by the exporting countries. It is being verified with the Government of the United Kingdom.

Norway, South Africa, France, Switzerland, the former Yugoslav Republic of Macedonia and Australia. Further details on international trade in AMA (CPS) can be found in tables XVI.1 and XVI.2.

28. AMA (CPS) is an intermediate product for the manufacture of morphine. It is also used in continuous manufacturing processes for the manufacture of codeine. Utilization of AMA (CPS) increased steadily until 2003, and has been fluctuating thereafter (see figure 8). In 2009, utilization amounted to 339 tons. The United Kingdom continued to be the major user country of AMA (CPS) (with 85.2 tons, or 25 per cent of the global total), followed by the United States (84.8 tons, or 25 per cent), France (74.5 tons, or 22 per cent), Australia (44.7 tons,[19] or 13 per cent), China (18.6 tons, or 5 per cent), Norway (11.9 tons, or 4 per cent), South Africa (8.9 tons, or 3 per cent) and Turkey (5.4 tons, or 2 per cent).

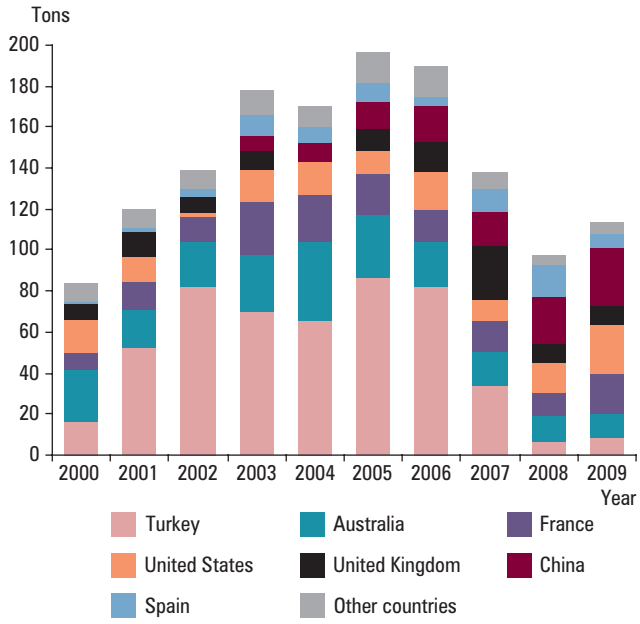
29. Global stocks of AMA (CPS) increased to 114 tons in 2009 (see figure 9). China held the largest stocks in 2009 (28.6 tons, or 25 per cent of the global total); other countries holding significant stocks of AMA (CPS) in 2009 were the United States (24 tons), France (19.2 tons), Australia (11.4 tons), the United Kingdom (9.1 tons), Turkey (8.7 tons), Spain (8.2 tons), and Norway (3.3 tons).

Figure 8. Anhydrous morphine alkaloid contained in concentrate of poppy straw: utilization for the manufacture of opiates, 1990-2009



[19]This figure is being clarified with the Government concerned.

Figure 9. Anhydrous morphine alkaloid contained in concentrate of poppy straw: stocks,[a] 2000-2009

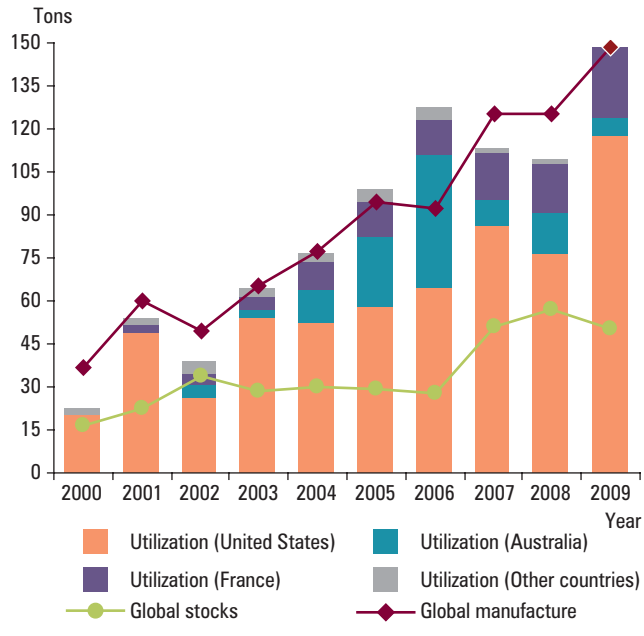


[a]Stocks as at 31 December.

Anhydrous thebaine alkaloid contained in concentrate of poppy straw (ATA (CPS))

30. Figure 10 provides an overview of the manufacture, stocks and utilization of ATA (CPS) during the period 2000-2009.

Figure 10. Anhydrous thebaine alkaloid contained in concentrate of poppy straw: utilization and global manufacture and stocks,[a] 2000-2009



[a]Stocks as at 31 December.

31. Industrial manufacture of ATA (CPS) started in 1998 and has increased rapidly since then, peaking at a level of 148 tons in 2009. Australia, France and Spain, in descending order, have been the only manufacturing countries, accounting respectively for 86 per cent, 14 per cent and 1 per cent of the global total in 2009. The United States has been the leading importer of ATA (CPS). In 2009, total imports were 121 tons, with the United States accounting for almost 100 per cent of those imports.

32. ATA (CPS) is an intermediate product for the manufacture of thebaine. Global utilization of ATA (CPS) increased sharply from 22 tons in 2000 to 149 tons in 2009, the highest level ever reported. This reflects the growing demand for thebaine and the substances that may be obtained from it. The United States continued to be the main user in 2009 (accounting for 79 per cent of global utilization), followed by France (16 per cent) and Australia (4 per cent). Global stocks of ATA (CPS) stood at 49.8 tons in 2009. The United States accounted for 76 per cent of the global total (37.8 tons), with significant stocks also being held in France (7.8 tons) and Australia (3.7 tons).

Anhydrous oripavine alkaloid contained in concentrate of poppy straw (AOA (CPS))

33. Manufacture of AOA (CPS) in commercially usable quantities started in 1999; Australia has been the only manufacturing country. In 2009, global manufacture amounted to 29.9 tons. AOA (CPS) has been used in Australia and the United States for the manufacture of oripavine and oxymorphone. In 2009, total utilization of AOA (CPS) amounted to 14.1 tons, with 55 per cent of that total reported by Australia and 45 per cent by the United States. Global stocks of AOA (CPS) have been fluctuating since 2001. In 2009, they stood at 16.1 tons, of which 70 per cent were held in the United States and the rest in Australia.

Anhydrous codeine alkaloid contained in concentrate of poppy straw (ACA (CPS))

34. Manufacture of ACA (CPS) amounted to 16.7 tons in 2009. France, Turkey and Spain, in descending order, have been the only countries manufacturing ACA (CPS), accounting respectively for 59 per cent, 39 per cent and 2 per cent of the global total in 2009. ACA (CPS) is used for the extraction of codeine. Global utilization of ACA (CPS) amounted in 2009 to 15.7 tons, of which 66 per cent was accounted for by France and 30 per cent by the United States. Global stocks of ACA (CPS) in 2009 stood at 2.6 tons, most of which were held in the United States, France and Turkey.

Opiates and opioids

35. "Opiate" is the term generally used to designate drugs derived from opium and their chemically related derivatives, such as the semi-synthetic alkaloids, while "opioid" is a more general term for both natural and synthetic drugs with morphine-like properties, although the chemical structure may differ from that of morphine.[20]

36. Opioids are used mostly for their analgesic properties to treat severe pain (fentanyl, hydromorphone, methadone, morphine and pethidine), moderate to severe pain (buprenorphine[21] and oxycodone) and mild to moderate pain (codeine, dihydrocodeine and dextropropoxyphene), as well as to induce or supplement anaesthesia (fentanyl and fentanyl analogues such as alfentanil and remifentanil). They are also used as cough suppressants (codeine, dihydrocodeine and, to a lesser extent, pholcodine and ethylmorphine), to treat gastrointestinal disorders, mainly diarrhoea (codeine and diphenoxylate), and to treat addiction to opioids (buprenorphine and methadone).

Natural alkaloids

37. Morphine, codeine, thebaine, noscapine, oripavine, papaverine and narceine are alkaloids contained in opium or poppy straw. Morphine and codeine are under international control because of their potential for abuse, while thebaine and oripavine are under such control because of their convertibility into opioids subject to abuse. Noscapine, papaverine and narceine are not under international control. Morphine is the prototype of natural opiates and many opioids and, because of its strong analgesic potency, it is used as a reference parameter for comparative purposes.

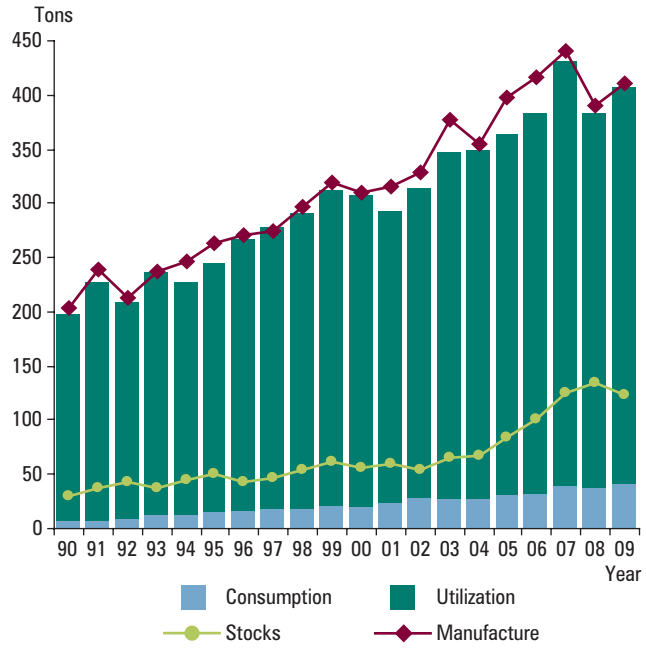
[20] From a clinical point of view, opioids may be classified according to their actions compared with those of morphine: similar affinity (agonist), competitive (antagonist) or mixed (agonist/antagonist) for the same receptor sites (the so-called opioid receptors) in the central and peripheral nervous system.

[21] Buprenorphine is controlled under the Convention on Psychotropic Substances of 1971. Comments on its licit movement are contained in paragraphs 107 and 108 below.

Morphine

38. Figure 11 presents data on the manufacture,[22] stocks, consumption and utilization of morphine in the period 1990-2009. Global manufacture of morphine followed a rising trend during the 20-year period, increasing from a level of about 200 tons in 1990 to a record level of 440 tons in 2007. In 2009, global manufacture reached 411 tons. Almost 90 per cent of the morphine manufactured globally is converted into other narcotic drugs and substances not covered by the 1961 Convention (see paragraphs 44 and 45 below). The rest is used for medical purposes.

Figure 11. Morphine: global manufacture, stocks,[a] consumption and utilization, 1990-2009

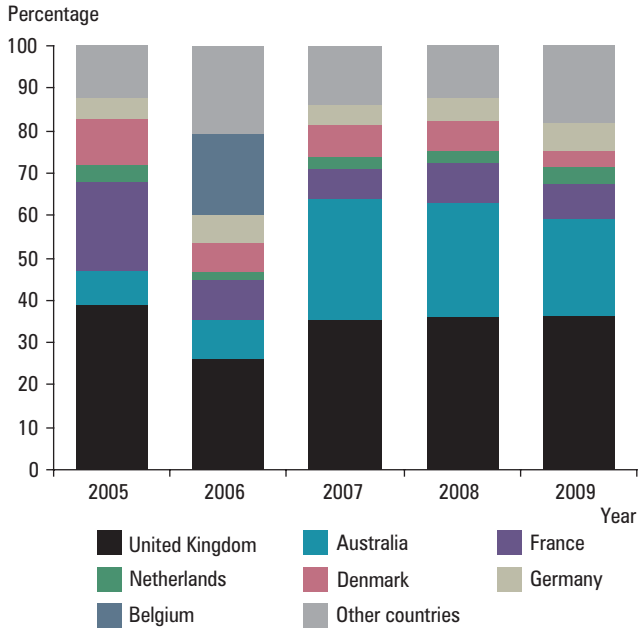


[a]Stocks as at 31 December.

39. In 2009, the leading manufacturing country of morphine was the United States (98.8 tons, or 24 per cent of global manufacture), followed by the United Kingdom (81.3 tons, or 20 per cent), France (76.9 tons, or 19 per cent), Australia (48.3 tons, or 12 per cent) and China (17.8 tons, or 4 per cent). Together, those five countries accounted for 80 per cent of global manufacture. Five other countries reported the manufacture of morphine in 2009 in quantities of more than 10 tons: Islamic Republic of Iran (17.1 tons), Norway (12.2 tons), Slovakia (11.4 tons), Japan (11 tons) and India (10.1 tons).

40. Total exports of morphine amounted to 28.2 tons in 2009. As can be seen in figure 12, the leading exporting country continued to be the United Kingdom (37 per cent of global exports), followed by Australia (23 per cent). Nine countries imported more than 1 ton of morphine in 2009: Brazil (8.9 tons), Germany (4 tons), Canada (3.1 tons), Austria (2 tons), France (1.9 tons), Denmark (1.5 tons), the United Kingdom (1.4 tons),[23] Hungary (1.2 tons) and the Netherlands (1.1 tons). Further details on exports and imports of morphine can be found in tables XVI.3 and XVI.4 respectively.

Figure 12. Morphine: export shares, 2005-2009



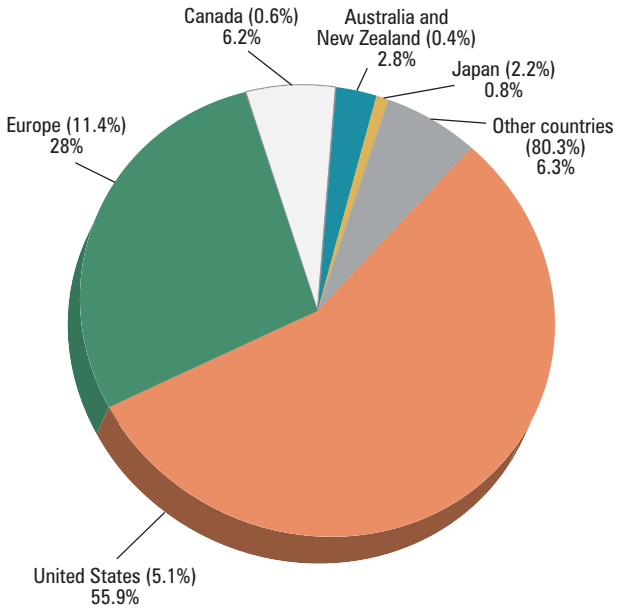
41. Global consumption of morphine, excluding preparations included in Schedule III of the 1961 Convention (see paragraph 43 below), rose by a factor of almost six over the two decades between 1990 and 2009. Between 1990 and 1999, consumption increased nearly threefold, from 7.2 tons to 20.3 tons, and then grew steadily, amounting to 41.8 tons (or 418 million S-DDD) in 2009. Consumption of morphine was reported by 145 countries in 2009 (see table XII). The differences in consumption levels among countries

[22]In Australia, Brazil, China, Iran (Islamic Republic of), Italy, the Netherlands, Norway, Portugal, Turkey and the United Kingdom, concentrate of poppy straw is used in continuous industrial processes for the manufacture of other narcotic drugs, without first separating morphine. For statistical and comparison purposes, the theoretical quantity of morphine involved in such conversions is calculated by INCB and included in the present publication in the statistics on global manufacture and utilization of morphine.

[23]This figure is based on data reported by the exporting countries. It is being verified with the Government of the United Kingdom.

continued to be very significant (see figure 13 and table XIV), owing to various economic, knowledge, regulatory and other factors influencing the use of morphine in the treatment of pain.

Figure 13. Morphine: distribution of consumption, 2009



Note: Percentages in parentheses refer to share of the world population (i.e. total population of all reporting countries).

42. In 2009, the United States was the main consumer country of morphine; with consumption of 23.4 tons, it accounted for 56 per cent of global consumption of morphine, excluding preparations included in Schedule III of the 1961 Convention. It was followed by the United Kingdom (3.5 tons, or 8 per cent of the world total), Canada (2.6 tons, or 6 per cent), France (2.1 tons, or 5 per cent), Germany (1.9 tons, or 4.5 per cent) and Austria (1.5 tons, or 3.6 per cent). Ranked according to defined daily doses for statistical purposes consumed per million inhabitants per day, the country with the highest consumption was Austria (4,890 S-DDD), where morphine is used for the treatment of pain as well as in substitution treatment of opioid addiction. In seven other countries, morphine consumption was over 1,000 S-DDD per million inhabitants per day in 2009: Canada (2,186 S-DDD), United States (2,139 S-DDD), Denmark (1,747 S-DDD), Switzerland (1,675 S-DDD), United Kingdom (1,594 S-DDD), New Zealand (1,414 S-DDD) and Australia (1,322 S-DDD).

43. In some countries, morphine is used for the manufacture of preparations included in Schedule III of the 1961 Convention. In 2009, China reported the use of 7.1 tons of morphine for the manufacture of such preparations. Other countries reporting the use of morphine for that purpose were Italy (890 kg), the United Kingdom (444 kg), Australia (347 kg), Uganda (4.5 kg), Panama (3 kg) and Zimbabwe (less than 1 kg).

44. The largest share of morphine is used for conversion into other opiates, such as codeine, ethylmorphine and pholcodine (see table VI). The amounts utilized for that purpose, which had fluctuated at around 200 tons per year until the beginning of the 1990s, has increased steadily since then, reaching 360 tons in 2009. Of the quantity utilized in 2009, 95 per cent was converted into codeine. The six main user countries in 2009 were the United States (70.9 tons, or 20 per cent of the world total), the United Kingdom[24] (69.6 tons, or 19 per cent), France (64.4 tons, or 18 per cent), Australia[24] (42.9 tons, or 12 per cent), the Islamic Republic of Iran[24] (20.1 tons, or 6 per cent) and Hungary (20 tons, or 6 per cent), which together accounted for nearly 80 per cent of global utilization. Other countries reporting conversion of morphine into other drugs in significant quantities in 2009 were Slovakia (13.1 tons), Norway[24] (12.1 tons) and Japan (10.4 tons).

45. Morphine is also used for the manufacture of substances not controlled under the 1961 Convention, such as noroxymorphone, nalorphine and naloxone. The quantity of morphine utilized for that purpose fluctuated greatly in the last two decades, amounting to 4.3 tons in 2009. The use of morphine for the manufacture of substances not controlled under the 1961 Convention was reported in 2009 by Brazil (4 tons), France (265 kg), Hungary (13 kg) and India (9 kg).

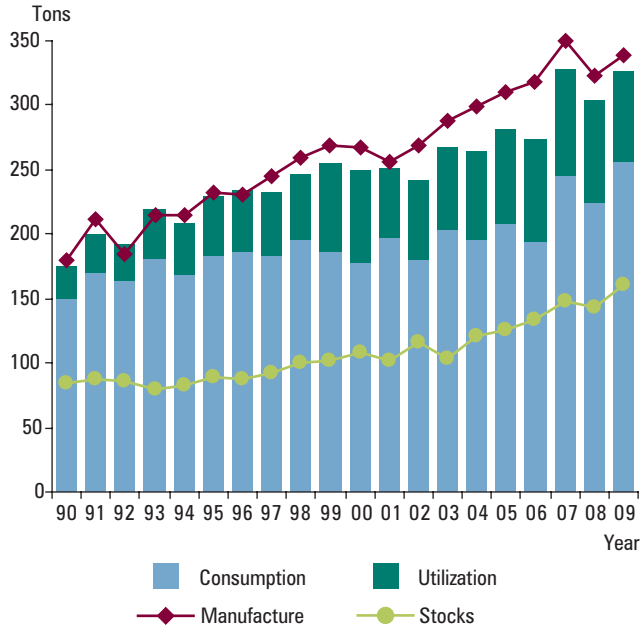
46. Global stocks of morphine followed a rising trend. In 2009 they stood at 123 tons. The largest stocks were held by the United States (46.8 tons, or 38 per cent of global stocks), the United Kingdom (24.5 tons, or 20 per cent) and France (18.6 tons, or 15 per cent).

Codeine

47. Codeine is a natural alkaloid of the opium poppy plant, but most (90-95 per cent) of the codeine currently being manufactured is obtained from morphine through a semi-synthetic process. Codeine is used mainly for the manufacture of preparations in Schedule III of the 1961 Convention, while a smaller quantity is used for the manufacture of other narcotic drugs, such as dihydrocodeine and hydrocodone. The trends in global manufacture, consumption, utilization and stocks of codeine during the period 1990-2009 are shown in figure 14.

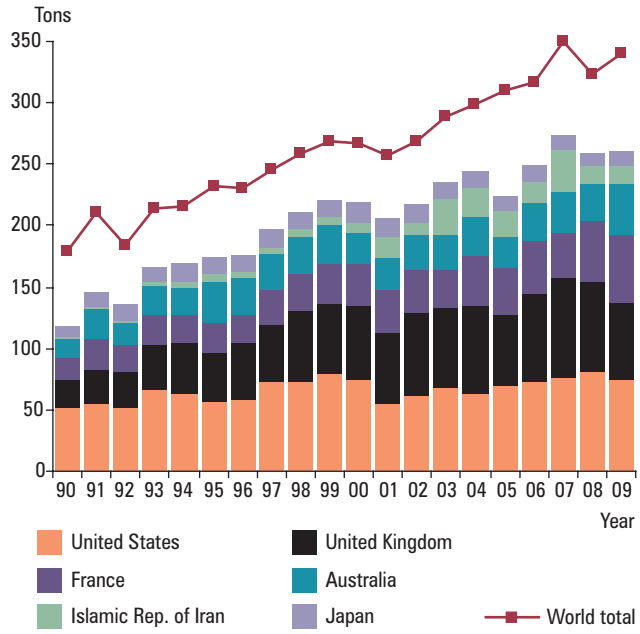
[24]This country reported utilization of large quantities of morphone alkaloid contained in concentrate of poppy straw for the manufacture of other alkaloids in continuous manufacturing processes. The published figure includes the theoretical quantity of morphine involved in such conversions as calculated by INCB.

Figure 14. Codeine: global manufacture, stocks,[a] consumption and utilization, 1990-2009



[a]Stocks as at 31 December.

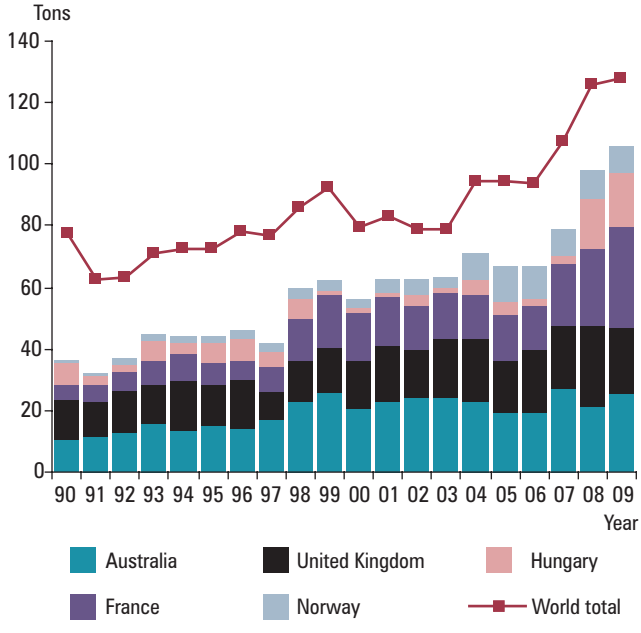
Figure 15. Codeine: manufacture, 1990-2009



48. After a general upward trend in the 1990s and an increase to the highest level ever reported (349 tons) in 2007, codeine manufacture stood at 340 tons in 2009 (see figure 15). The main manufacturing country was the United States, with 74.5 tons (22 per cent of global manufacture), followed by the United Kingdom (62.5 tons, or 18 per cent), France (55.6 tons, or 16 per cent) and Australia (41.2 tons, or 12 per cent).

49. World exports of codeine followed a rising trend, reaching 128 tons in 2009, the highest level ever reported (see figure 16). France was the leading exporting country of codeine in 2009, with 32.5 tons, accounting for 25 per cent of world exports, followed by Australia (24.6 tons, or 19 per cent of world exports), the United Kingdom (21.2 tons, or 17 per cent) and Hungary (17.5 tons, or 14 per cent). The main importing countries of codeine in 2009 were India (23.7 tons), Canada (16.8 tons) and the United Kingdom (8.4 tons). Fifteen other countries reported imports of between 1 and 9 tons in 2009. More details on international trade in codeine can be found in tables XVI.3 and XVI.4.

Figure 16. Codeine: exports, 1990-2009

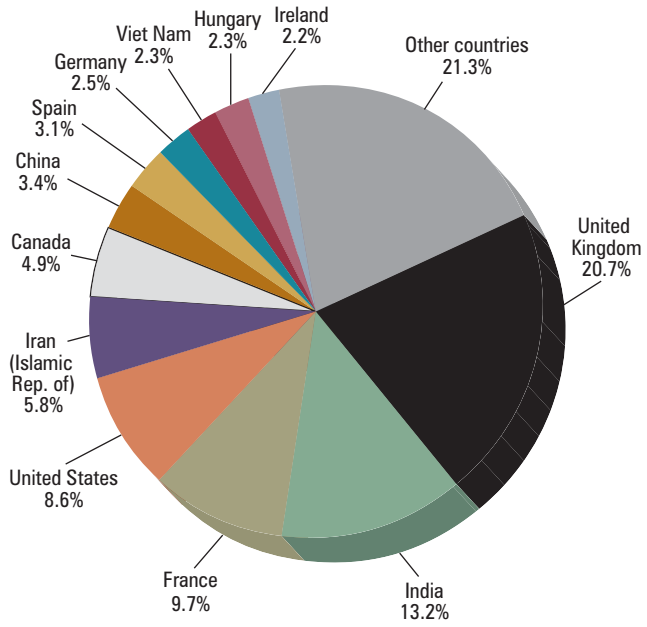


50. Codeine is used mainly in the form of preparations listed in Schedule III of the 1961 Convention. In 2009, preparations listed in Schedule III accounted for 97 per cent of the total consumption of codeine. The consumption of codeine grew from 150 tons in 1990 to an all-time high of 254 tons in 2009 (see figure 14), making codeine the most widely used opiate in medical practice globally in terms of defined daily doses for statistical purposes (2.5 billion S-DDD). It should be noted that countries reporting the utilization of codeine for the manufacture of preparations listed in Schedule III are not necessarily the countries of consumption of those preparations. Large quantities of those preparations are exported from some of these countries.

51. The main countries reporting the use of codeine for the manufacture of preparations listed in Schedule III in 2009 were the United Kingdom (51.4 tons), India (32.9 tons), France (24 tons), the United States (21.3 tons),

the Islamic Republic of Iran (14.5 tons) and Canada (12.3 tons), which together accounted for 63 per cent of global use in 2009. Other major user countries were, in descending order of quantity used, China, Spain, Germany, Viet Nam, Hungary and Ireland (see figure 17).

Figure 17. Codeine: utilization for the manufacture of preparations listed in Schedule III of the 1961 Convention, 2009



52. Utilization of codeine for the manufacture of other narcotic drugs, mainly dihydrocodeine and hydrocodone, increased steadily, reaching the highest level in 2007 (81.8 tons). Utilization declined to 70 tons in 2009. Of the amount reported for 2009, 43.3 tons were used in the United States, mainly for the manufacture of hydrocodone, while 12.6 tons were used in Japan, 9.7 tons in the United Kingdom and 4.6 tons in Italy for the manufacture of dihydrocodeine.

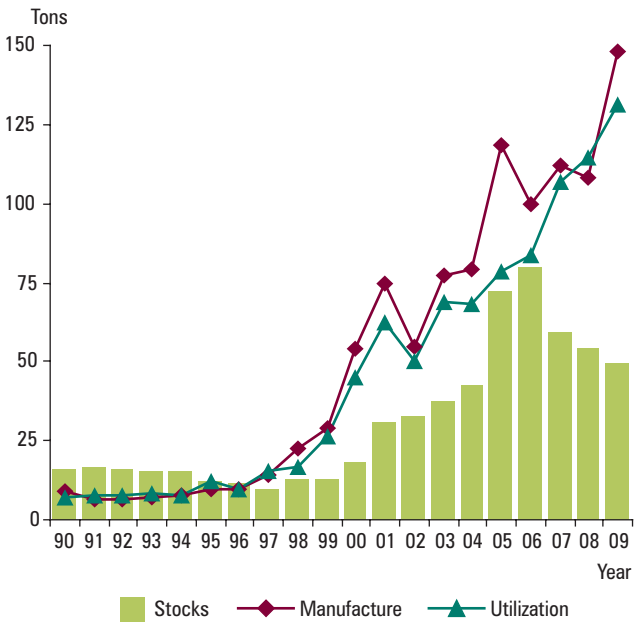
53. Global stocks of codeine amounted to 160 tons in 2009. About 60 per cent of global stocks were held by five countries: United States (31.7 tons), Australia (23.5 tons), France (16.8 tons), the United Kingdom (14.9 tons) and Slovakia (10.2 tons). Thirteen other countries held stocks of codeine in quantities of more than 1 ton; those countries, in descending order of quantity of stocks, were India, Japan, Spain, Hungary, Canada, South Africa, Norway, Germany, Italy, Viet Nam, Turkey, the Russian Federation and China.

Thebaine

54. Until the 1990s, thebaine was manufactured mainly from opium; since 1999, it has been obtained primarily from poppy straw. Thebaine may also be obtained through the conversion of oripavine or from semi-synthetic opioids. Thebaine is not itself used in therapy, but it is an important starting material for the manufacture of a number of opioids, mainly codeine, dihydrocodeine, etorphine, hydrocodone, oxycodone and oxymorphone (all of which are controlled substances under the 1961 Convention) and buprenorphine (which is a controlled substance under the Convention on Psychotropic Substances of 1971),[25] as well as for substances not under international control, such as the derivatives naloxone, naltrexone, nalorphine and nalbuphine.

55. Global manufacture of thebaine has increased sharply since the late 1990s as a consequence of the growing demand for oxycodone and other drugs and substances that may be derived from it. In 2009, global manufacture reached a peak of 148 tons (see figure 18 and tables III and V). The United States continued to be the leading manufacturing country, accounting in 2009 for 78.1 tons, or 53 per cent of global manufacture. The other major manufacturers of thebaine were Spain (28.2 tons, or 19 per cent of the world total), Australia (22 tons, or 15 per cent) and France (17.4 tons, or 12 per cent). Global exports of thebaine reached a peak of 50.3 tons in 2009. Australia and Spain remained the main exporting countries in 2009, together accounting for almost 97 per cent of the world total. The main importing country of thebaine was the United Kingdom (24.8 tons).[23]

Figure 18. Thebaine: global manufacture, utilization and stocks,[a] 1990-2009

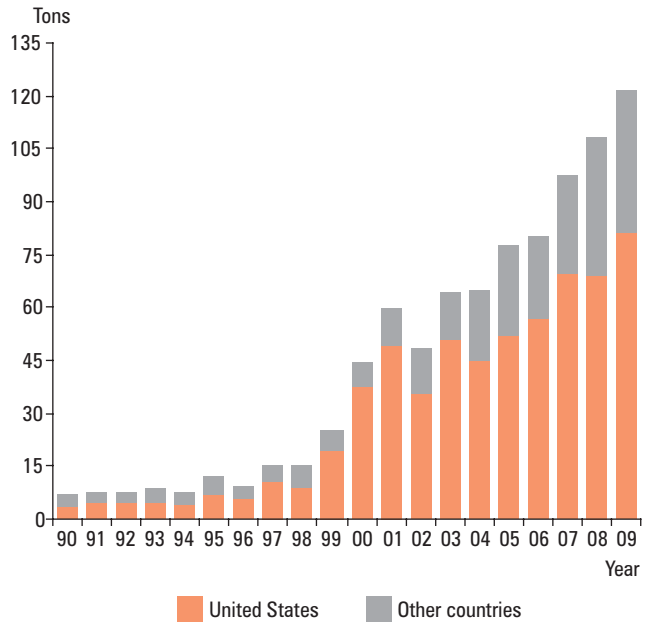


[a]Stocks as at 31 December of each year.

[25]United Nations, *Treaty Series*, vol. 1019, No. 14956.

56. Utilization of thebaine for the manufacture of other narcotic drugs continued to increase, reaching 121 tons in 2009 (see figure 19 and table VII). The United States was the main user country of thebaine during the 20-year period from 1990 to 2009. In 2009, the United States accounted for 67 per cent of global use, followed by France, which accounted for 23 per cent. The quantity of thebaine reported as used for the manufacture of substances not covered under the 1961 Convention (mainly buprenorphine) fluctuated during the 10-year period from 2000 to 2009; in 2009, it amounted to 10 tons, with the United Kingdom and Germany together accounting for more than 80 per cent of the world total.

Figure 19. Thebaine: utilization for the manufacture of opioids, 1990-2009



57. Global stocks of thebaine stood at 49.5 tons in 2009. Major stocks were held in the United States (23.7 tons), France (8.6 tons), Japan (4.2 tons), the United Kingdom (3.6 tons) and Spain (3.6 tons).

Oripavine

58. In 2007, oripavine was included in Schedule I of the 1961 Convention. The United States (4.6 tons) and Australia (4.1 tons) were the only countries reporting manufacture of oripavine in 2009. The use of oripavine in significant quantities for the manufacture of other drugs was reported in 2009 by Australia (7.4 tons, mainly for thebaine) and the United States (3.4 tons, mainly for oxymorphone and hydromorphone). Global stocks of oripavine amounted to 6.1 tons in 2009, of which 78 per cent was held in the United States and 22 per cent in Australia.

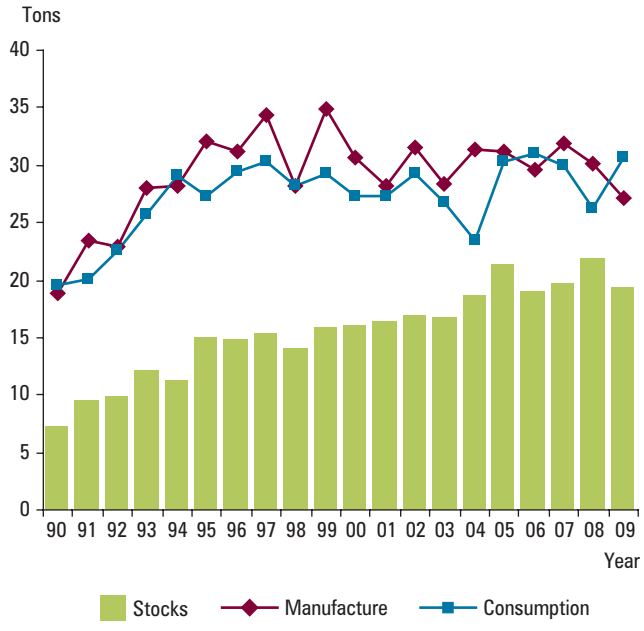
Semi-synthetic opioids

59. Semi-synthetic opioids are made by relatively simple chemical modifications of natural opiates, such as morphine, codeine and thebaine. Some examples of those derivatives are dihydrocodeine, ethylmorphine, heroin, oxycodone and pholcodine. The information on semi-synthetic opioids is presented in English alphabetical order.

Dihydrocodeine

60. Global manufacture of dihydrocodeine rose until 1999, when it reached 34.8 tons. After 2000, the annual manufacture fluctuated between 28.2 tons and 31.9 tons and stood at 27.1 tons in 2009 (see figure 20). In 2009, Japan, the United Kingdom and Italy were the main manufacturing countries, accounting for 39 per cent, 34 per cent and 17 per cent of the world total respectively.

Figure 20. Dihydrocodeine: global manufacture, consumption and stocks,[a] 1990-2009



[a]Stocks as at 31 December of each year.

61. Global exports of dihydrocodeine amounted to 9.8 tons in 2009. The main exporting country was Italy, accounting for 39 per cent of world exports, followed by the United Kingdom (25 per cent), while Belgium, France and Slovakia each exported between 1 and 1.2 tons of dihydrocodeine. The United Kingdom was the leading importing country of dihydrocodeine in 2009 (3 tons); other main importers were the Republic of Korea (1.9 tons) and France (1.1 tons).

62. Dihydrocodeine is consumed mainly in the form of preparations included in Schedule III of the 1961 Convention, which accounted for 95 per cent of total consumption in 2009. In that year, use of dihydrocodeine reached 30.7 tons (about 300 million S-DDD). The main user countries of dihydrocodeine were Japan and the United Kingdom, each accounting for 37 per cent of the world total, followed by the Republic of Korea (9 per cent), Italy (5 per cent) and Hungary (3 per cent).

63. Global stocks of dihydrocodeine amounted to 19.3 tons in 2009. Major stocks were held in Japan (50 per cent of global stocks), the United Kingdom (13 per cent) and Italy (10 per cent).

Ethylmorphine

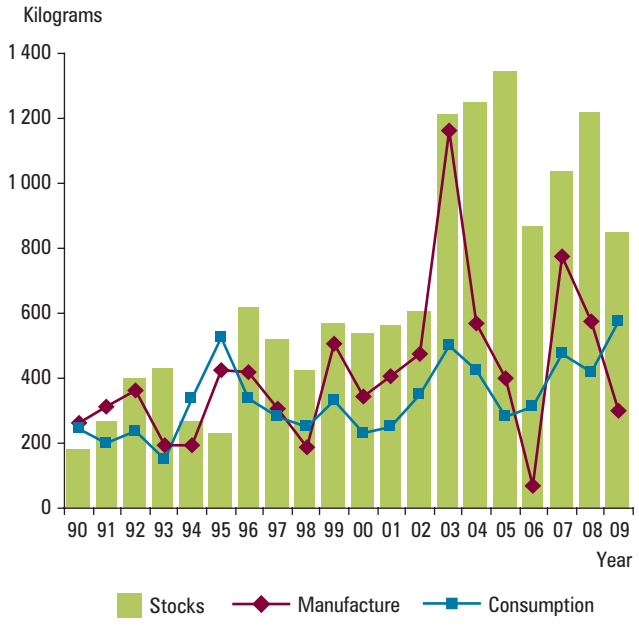
64. Global manufacture of ethylmorphine declined steadily over the period 1990-2004, falling from a level of 4 tons in 1990 to just 941 kg in 2004, the lowest level ever reported.[26] Manufacture started to increase again in 2005, reaching 2.3 tons in 2008, but declined to 1.4 tons in 2009. France and India were the main manufacturing countries in 2009, accounting for 69 and 23 per cent of global manufacture respectively. France continued to be the leading exporting country, accounting for 83 per cent of global exports of 1.1 tons. The two largest importers in 2009, Sweden and Belgium, imported 543 and 276 tons of ethylmorphine respectively. Ethylmorphine is consumed mainly in the form of preparations listed in Schedule III of the 1961 Convention (about 96 per cent of total consumption). Global utilization reached 1.6 tons in 2009 (32 million S-DDD). The main user countries in 2009 were Sweden (35 per cent of the world total), India (19 per cent), Belgium (15 per cent) and France (10 per cent). Global stocks of ethylmorphine totalled 1.6 tons in 2009. Major stocks were held in France (45 per cent of global stocks), Turkey (19 per cent) and Hungary (13 per cent).

Heroin

65. From 1989 to 2002, global licit manufacture of heroin fluctuated between 200 kg and 500 kg. In 2003, it increased sharply to 1.2 tons, the highest amount ever reported. After 2003, manufacture declined and fluctuated, reaching 300 kg in 2009 (see figure 21). The fluctuations reflect changes in the manufacture reported by Switzerland (54 per cent of global manufacture) and the United Kingdom (46 per cent).

[26] In 1972, global manufacture of ethylmorphine reached a record high of 10 tons.

Figure 21. Heroin: global manufacture, consumption and stocks,[a] 1990-2009



[a] Stocks as at 31 December of each year.

66. In 2009, the United Kingdom continued to be the main exporting country of heroin (413 kg, or 83 per cent of global exports). The other countries reporting exports of heroin greater than 1 kg were the Netherlands (30 kg), Switzerland (29 kg), Hungary (15 kg) and Germany (12 kg). Switzerland continued to be the main importing country of heroin in 2009 (212 kg), followed by the Netherlands (110 kg), the United Kingdom (83 kg), Germany (64 kg) and Hungary (26 kg).

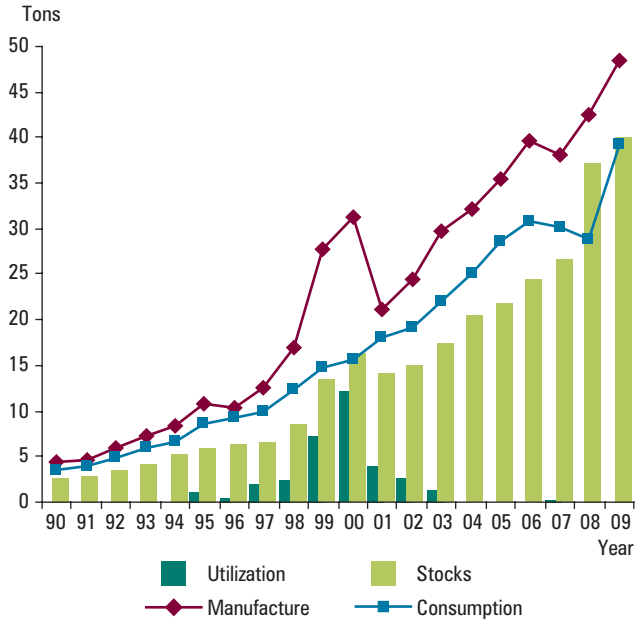
67. Global consumption of heroin stood at 575 kg in 2009. Switzerland, where heroin is prescribed to long-term opiate addicts, reported consumption of 212 kg in 2009. Other countries with significant heroin consumption in 2009 were the United Kingdom (189 kg), the Netherlands (136 kg) and Germany (34 kg).

68. Global stocks of heroin amounted to 848 kg in 2009. Countries reporting significant stocks in 2009 were the United Kingdom (41 per cent of global stocks), Switzerland (32 per cent) and the Netherlands (13 per cent).

Hydrocodone

69. Global manufacture of hydrocodone followed an upward trend in the period 1990-2009, reaching 48.4 tons in 2009 (see figure 22). The United States accounted with 48.3 tons for more than 99 per cent of the world total manufacture.

Figure 22. Hydrocodone: global manufacture, consumption, utilization[a] and stocks,[b] 1990-2009



[a]Utilization for the manufacture of other drugs.
[b]Stocks as at 31 December of each year.

70. Global consumption of hydrocodone stood at 39.1 tons in 2009, with the United States accounting for almost the entirety of the world total (more than 99 per cent). The high consumption in the United States makes hydrocodone one of the narcotic drugs most used in medical practice in terms of defined daily doses for statistical purposes (about 2.6 billion S-DDD). Ranked according to defined daily doses for statistical purposes consumed per million inhabitants per day, the countries with the highest consumption of hydrocodone in 2009 were the United States (23,822 S-DDD), Palau (575 S-DDD) and Canada (283 S-DDD). Global stocks of hydrocodone also showed an upward trend, standing at 40.2 tons in 2009, of which more than 99 per cent were held by the United States.

Hydromorphone

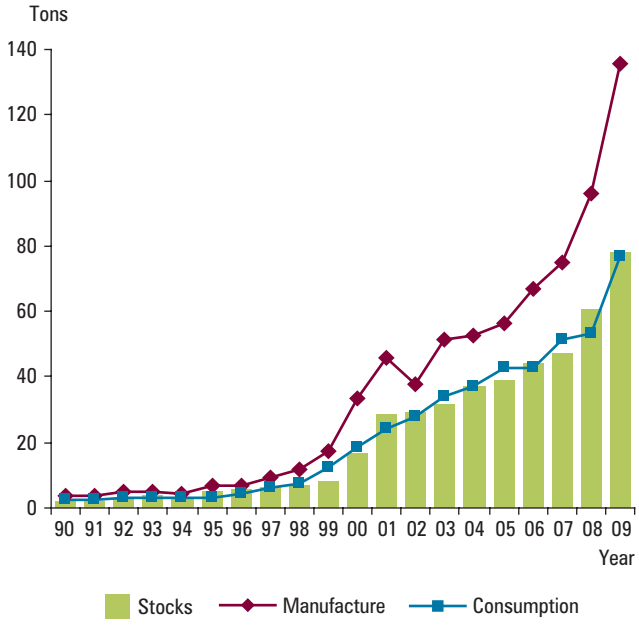
71. Global manufacture of hydromorphone increased sharply during the period 1990-2009, reaching 6.5 tons in 2009. The United States (72 per cent of global manufacture) and the United Kingdom (21 per cent) were the leading manufacturing countries in 2009. Total exports of hydromorphone have followed an upward trend, reaching 1.9 tons in 2009. The leading exporting countries were the United Kingdom (51 per cent of world exports) and the United States (20 per cent). Canada remained the main importing country (912 kg) in 2009, followed by Germany (451 kg) and France (185 kg).

72. Global consumption of hydromorphone increased steadily, reaching in 2009 its highest level of 3.7 tons (183 million S-DDD). The United States remained the main consumer country in 2009 (60 per cent of global consumption), followed by Canada (22 per cent of global consumption) and Germany (10 per cent of global consumption). Ranked according to defined daily doses for statistical purposes consumed per million inhabitants per day, the countries with the highest consumption of hydromorphone in 2009 were Canada (3,381 S-DDD), Austria (1,076 S-DDD), the United States (1,009 S-DDD) and Germany (583 S-DDD). Global stocks of hydromorphone reached 5 tons in 2009, of which 69 per cent were held in the United States.

Oxycodone

73. Global manufacture of oxycodone has increased sharply over the past years, reaching a record level of 135.9 tons in 2009 (see figure 23). The United States accounted for 71 per cent of the world total. The manufacture of oxycodone grew steadily in France and the United Kingdom, which contributed 17 and 9 per cent of the world total respectively. In addition, Switzerland accounted for 3 per cent of global manufacture in 2009.

Figure 23. Oxycodone: global manufacture, consumption and stocks,[a] 1990-2009



[a]Stocks as at 31 December of each year.

74. Total exports of oxycodone rose steadily during the period 2000-2009 and stood at 19.1 tons in 2009. The United Kingdom continued to be the main exporting country in 2009 (60 per cent of world exports), followed by the United States (17 per cent of world exports) and

Switzerland (7 per cent). Quantities between 5.3 tons and 1.1 tons were imported by, in descending order of quantity imported, Canada, the United Kingdom, Germany, Switzerland, Australia and Denmark.

75. Global consumption has risen steadily, reflecting the increased use of oxycodone for the treatment of moderate to severe pain. In 2009, global consumption reached a peak of 77 tons (about 1 billion S-DDD). That was mainly a result of increased consumption in the United States, which continued to be the principal consumer country of oxycodone, accounting for 81 per cent of the world total. Other major consumer countries in 2009 were Canada (4.8 tons), the United Kingdom (2.4 tons), Germany (2.1 tons) and Australia (1.5 tons) together accounting for 18 per cent of global consumption. Tables XVI.3 and XVI.4 provide further details on exports and imports of oxycodone. Ranked according to defined daily doses for statistical purposes consumed per million inhabitants per day, the five countries with the highest consumption of oxycodone in 2009 were the United States (7,601 S-DDD), Canada (5,427 S-DDD), Australia (2,658 S-DDD), Denmark (2,453 S-DDD) and the United Kingdom (1,482 S-DDD).

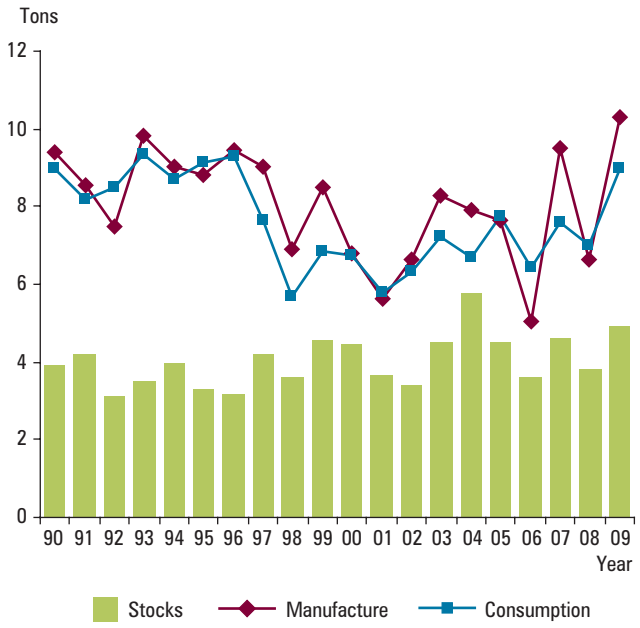
76. Global stocks of oxycodone reached 78 tons in 2009, the highest level ever recorded. The United States accounted for 72 per cent of the world total, followed by Switzerland (8 per cent of global stocks) and the United Kingdom (7 per cent of global stocks).

Pholcodine

77. Global manufacture of pholcodine has fluctuated between 1990 and 2009, when it reached 10.3 tons (see figure 24). The main manufacturers were France, the United Kingdom and Hungary, which accounted for 49 per cent, 27 per cent and 12 per cent of the world total respectively. Total exports of pholcodine reached 4.6 tons in 2009, with the main exporting countries being the United Kingdom (38 per cent of global exports), Norway (24 per cent), Hungary (24 per cent) and France (17 per cent). The main importers in 2009 were the Hong Kong Special Administrative Region of China (1.7 tons), Pakistan (645 kg), Australia (533 kg) and Algeria (450 kg). Further details on exports and imports of pholcodine are provided in tables XVI.3 and XVI.4.

78. Most pholcodine is consumed in the form of preparations listed in Schedule III of the 1961 Convention; in 2009, such preparations accounted for 95 per cent of total consumption. Global consumption of pholcodine reached 9 tons (180 million S-DDD) in 2009. The major user countries and territories in 2009 were France (45 per cent of the world total), the Hong Kong Special Administrative Region of China (13 per cent), Pakistan (10 per cent) and the United Kingdom (9 per cent). Global stocks of pholcodine stood at 5 tons in 2009. Major stocks were held by France (26 per cent of global stocks), the Hong Kong Special Administrative Region of China (19 per cent) and the United Kingdom (13 per cent).

Figure 24. Pholcodine: global manufacture, consumption and stocks,[a] 1990-2009



[a]Stocks as at 31 December of each year.

Synthetic opioids

79. Synthetic opioids are used in the treatment of chronic, moderate or severe pain. They are also used for the induction of general anaesthesia and in the treatment of specific conditions such as gastrointestinal disorders. In addition, methadone is used in treatment related to drug dependency. The information on synthetic opioids is presented in English alphabetical order.

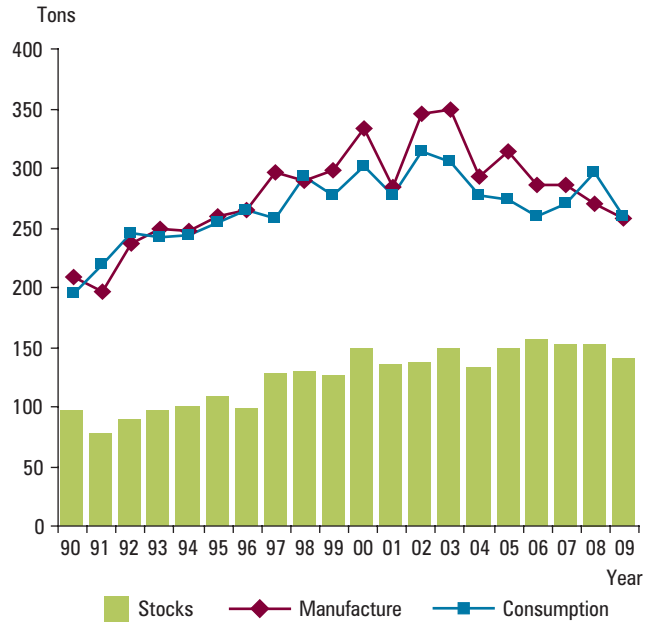
Dextropropoxyphene

80. Manufacture of dextropropoxyphene has followed a general downward trend since 2003 (see figure 25) and stood at 258 tons in 2009. India was the main manufacturing country, accounting for 57 per cent of the world total, followed by the United States, Italy and France, which accounted for 31 per cent, 7 per cent and 4 per cent of the world total respectively.

81. Export from India, the principal exporting country of dextropropoxyphene in 2009, accounted for 49 per cent of global exports which amounted to 58.7 tons in 2009. Exports from Italy and France accounted for 29 per cent

and 12 per cent of the global total respectively. France was the main importing country of dextropropoxyphene in 2009 (13.2 tons), followed by the Syrian Arab Republic (4.6 tons), Algeria (4 tons), Switzerland (3.7 tons) and Spain (2.7 tons).

Figure 25. Dextropropoxyphene: global manufacture, consumption and stocks,[a] 1990-2009



[a]Stocks as at 31 December of each year.

82. Dextropropoxyphene is consumed mainly in the form of preparations listed in Schedule III of the 1961 Convention (more than 99 per cent of the total quantity used in 2009). Countries that report the utilization of dextropropoxyphene for the manufacture of preparations listed in Schedule III may also export those preparations. Global use of dextropropoxyphene peaked in 2002 at 315 tons and has followed a downward trend since then. Global use amounted to 259 tons in 2009 (corresponding to about 1 billion S-DDD). The countries reporting the highest levels of utilization were India (48 per cent of the global total), followed by the United States (29 per cent) and France (8 per cent).

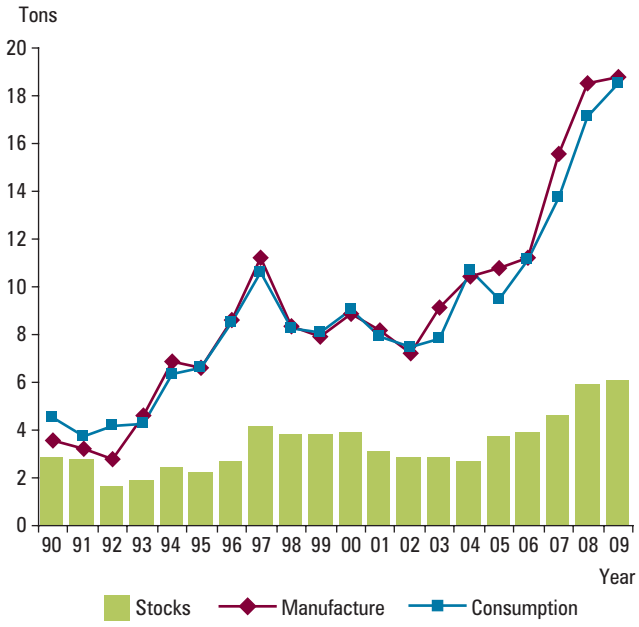
83. Global stocks of dextropropoxyphene in 2009 stood at 140 tons. The largest stocks were held by the major manufacturing and importing countries: United States (50.3 tons), India (25 tons), France (23.7 tons), Italy (22.51 tons) and Pakistan (3.6 tons).

Diphenoxylate

84. Manufacture of diphenoxylate has followed a generally rising trend after 1992, reaching a peak of 18.8 tons in 2009 (see figure 26). India was the main manufacturing country in 2009, contributing 83 per cent of the global total; it was followed by China, with 13 per cent, and the United States, with 4 per cent. India was also the main exporting country, accounting with 2 tons for 96 per cent of world exports. Pakistan was the principal importing country of diphenoxylate (605 kg), followed by the Islamic Republic of Iran (302 kg).

85. In 2009, more than 99 per cent of the diphenoxylate consumed was in the form of preparations listed in Schedule III of the 1961 Convention. Global use in 2009 reached 18.3 tons, corresponding to 1.2 billion S-DDD. The countries reporting the highest use of diphenoxylate for the manufacture of preparations listed in Schedule III in 2009 were India (74 per cent of the global total) and China (13 per cent). Global stocks of diphenoxylate in 2009 amounted to 6.1 tons, 80 per cent of which were held by India and 7 per cent by Pakistan.

Figure 26. Diphenoxylate: global manufacture, consumption and stocks,[a] 1990-2009



[a]Stocks as at 31 December of each year.

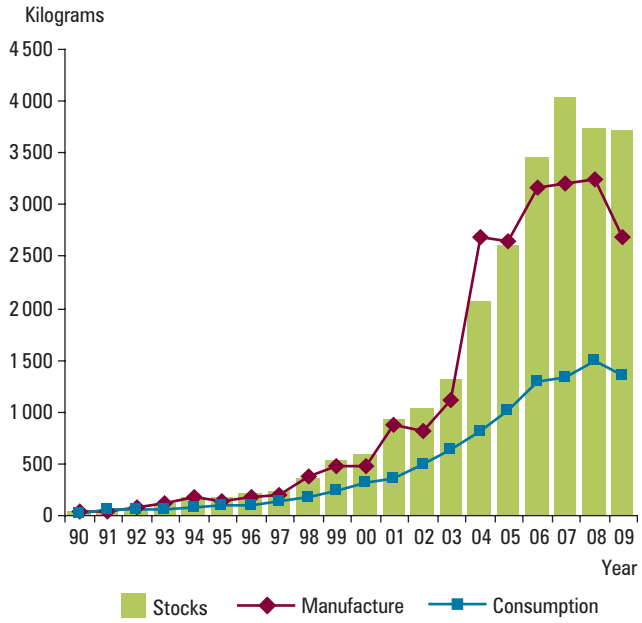
Fentanyl

86. Fentanyl, when used as an analgesic, is about 100 times more potent than morphine and is therefore used only in very small doses (for example, 0.005-0.1 mg in injectable form). Until the 1980s, fentanyl was used mainly for the induction of anaesthesia and, in combination with other substances, for a balanced anaesthesia in short-term surgical interventions. Since the early 1990s, however, controlled-release preparations (patches) of fentanyl have been increasingly used in all parts of the world for the treatment of severe pain.

87. Global manufacture of fentanyl increased slowly until 1992, when it reached a level of 77 kg, and then it grew more rapidly, amounting to a record level of 3.2 tons in 2008 (see figure 27). Global manufacture declined to 2.7 tons in 2009. The United States was the main manufacturing country of fentanyl in 2009 (57 per cent of global manufacture), followed by Belgium (30 per cent) and the United Kingdom (7 per cent).

88. Belgium exported 975 kg of fentanyl in 2009, making it the principal global exporting country. It was followed by Ireland (527 kg), Germany (272 kg), South Africa (171 kg) and the United States (151 kg). In 2009, Ireland was the leading importing country of fentanyl (593 kg), followed by Germany (513 kg), Belgium (356 kg), the United Kingdom (217 kg) and Canada (95 kg). Tables XVI.3 and XVI.4 provide further details on exports and imports, respectively, of fentanyl.

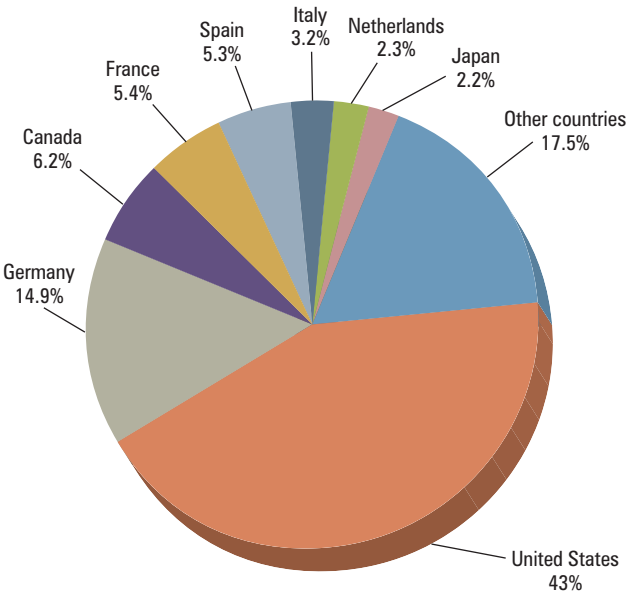
Figure 27. Fentanyl: global manufacture, consumption and stocks,[a] 1990-2009



[a]Stocks as at 31 December of each year.

89. Global consumption of fentanyl has followed an increasing trend, reaching 1.5 tons in 2008 and 1.4 tons in 2009 (corresponding to 2.3 billion S-DDD). Fentanyl is the synthetic opioid with the highest consumption in terms of defined daily doses consumed. The United States, accounting for 43 per cent of the world total, continued to be the main consumer country of fentanyl in 2009, followed by Germany, Canada, France and Spain (see figure 28). Ranked according to defined daily doses for statistical purposes consumed per million inhabitants per day, the countries and territories having the largest consumption of fentanyl in 2009 were Gibraltar (12,740 S-DDD), Canada (12,004 S-DDD), Germany (11,145 S-DDD), Austria (11,130 S-DDD) and the United States (8,879 S-DDD).

Figure 28. Fentanyl: distribution of consumption, 2009



90. Global stocks of fentanyl stood at 3.7 tons in 2009 (see figure 27). The largest stocks were held by the United States (44 per cent of global stocks), followed by Belgium (23 per cent), Germany (16 per cent), Ireland (7 per cent) and Netherlands (2 per cent).

Fentanyl analogues

91. The fentanyl analogues alfentanil, remifentanil and sufentanil are used mainly as anaesthetics.

Alfentanil

92. Global manufacture of alfentanil decreased to 5.7 kg in 2009 from 34.7 kg in 2008. The United Kingdom, the main manufacturing country, accounted for 73 per cent of global manufacture; it was followed by the United States (13 per cent) and Brazil (12 per cent). Global consumption of alfentanil in 2009 amounted to 18 kg. The United Kingdom consumed the largest amount of alfentanil (53 per cent of global consumption); it was followed by Germany (12 per cent) and France (8 per cent). Global stocks of alfentanil stood at 49 kg in 2009, most of which was held by Belgium (81 per cent of the global total).

Remifentanil

93. In 2009, global manufacture of remifentanil reached a peak of 86.7 kg. The United Kingdom accounted for 64 per cent of the global total, followed by Belgium (27 per cent) and China (7 per cent). Global consumption of remifentanil continued to increase, reaching 42 kg in 2009. Italy and Germany were leading consumer countries (accounting for 17 per cent and 12 per cent of the global total respectively). They were followed by Japan (10 per cent), the United Kingdom (9 per cent) and China (8 per cent). Global stocks of remifentanil in 2009 amounted to 89 kg, of which 37 per cent were held by Belgium, 28 per cent by the United Kingdom and 16 per cent by Italy.

Sufentanil

94. Global manufacture of sufentanil stood at 6.4 kg in 2009, with Belgium and the United States accounting for 48 per cent and 45 per cent of global manufacture respectively. Global consumption of sufentanil amounted to 3 kg in 2009. Belgium, France, Germany, the United States and China were the five largest consumers of sufentanil, together accounting for 84 per cent of the global total. Detailed information on the consumption of fentanyl analogues is provided in table XIII.1. Global stocks of sufentanil in 2009 totalled 12.1 kg, most of which was held by the United States (57 per cent), Belgium (16 per cent) and China (9 per cent).

Ketobemidone

95. Global manufacture of ketobemidone reached 507 kg in 2003, the highest level in 10 years, and then decreased to 284 kg in 2005; no manufacture was reported in 2006 and 2007 and less than 1 kg was manufactured in 2008 and in 2009 (by Denmark). Germany remained the major exporting country of ketobemidone in 2009, at 80 kg accounting for 99 per cent of global exports. The main importing countries were Sweden (24 kg) and Norway (17 kg).

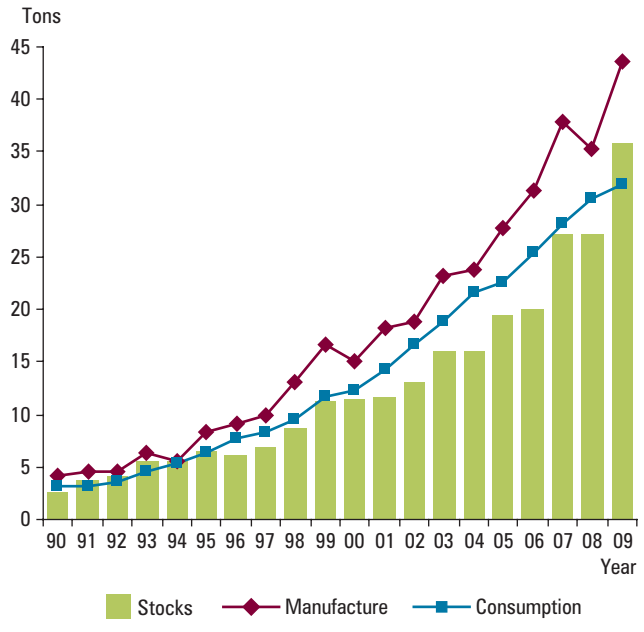
96. Global consumption of ketobemidone, which takes place almost exclusively in the Scandinavian countries (99 per cent of the world total), amounted to 66 kg in 2009 (corresponding to 1.3 million S-DDD). Denmark (59 per cent of the global total) remained the main consumer country of ketobemidone, followed by Norway (21 per cent) and Sweden (18 per cent). Global stocks of ketobemidone dropped to 228 kg in 2009 from a peak of 663 kg in 2005. Germany continued to hold the largest stocks (75 per cent of the global total).

Methadone

97. Global manufacture of methadone has increased steadily over the past 20 years and rose to its highest level in 2009, at 43.9 tons (see figure 29). Two countries accounted for the majority of global manufacture: United States (19.2 tons, or 44 per cent of global manufacture) and Switzerland (15.3 tons, or 35 per cent of global manufacture). Five other countries reported manufacture of methadone in 2009 in quantities of more than 1 ton: United Kingdom (3.1 tons), India (1.8 tons), Germany (1.4 tons), Spain (1.4 tons) and China (1.1 tons).

98. Global exports of methadone in 2009 stood at 15.6 tons. Switzerland remained the main exporting country (9.4 tons), followed by India (1.8 tons) and the United Kingdom (1.5 tons). The principal importing countries of methadone in 2009 were Italy (1.5 tons), Canada (1.4 tons), Switzerland (1.3 tons), the Islamic Republic of Iran (1.3 tons) and Germany (1.2 tons). Tables XVI.3 and XVI.4 provide further details respectively on exports and imports of methadone.

Figure 29. Methadone: global manufacture, consumption and stocks,[a] 1990-2009



[a]Stocks as at 31 December of each year.

99. Although methadone is used in several countries for the treatment of pain, the sharp upward trend in consumption is mainly attributable to its growing use in the treatment of opioid addiction. Global consumption of methadone rose to 31.8 tons in 2009. The United States remained the main consumer country (48 per cent of the global total), followed by the United Kingdom (10 per cent) and the Islamic Republic of Iran (8 per cent).

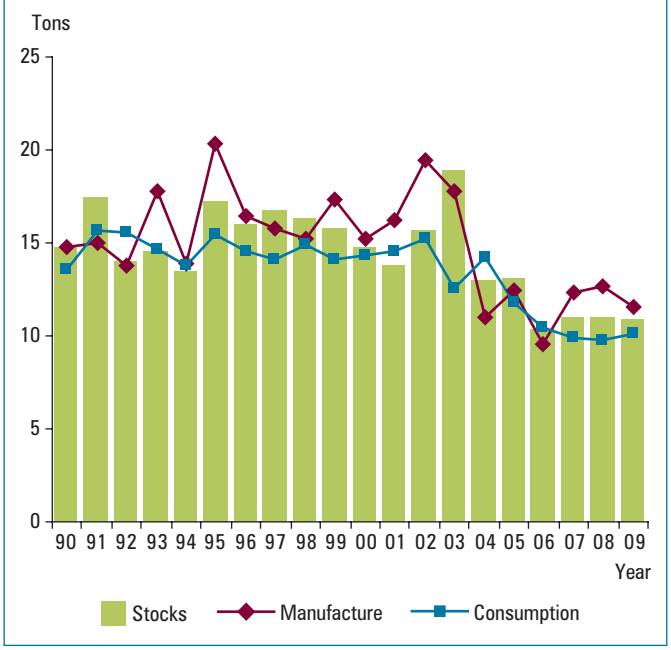
More details on the consumption of methadone can be found in table XII.

100. Global stocks of methadone amounted to 36 tons in 2009. The countries holding the largest stocks were Switzerland (38 per cent of global stocks) and the United States (35 per cent).

Pethidine

101. Global manufacture of pethidine stood at 11.6 tons in 2009 (see figure 30). The United States continued to be the main manufacturing country (37 per cent of global manufacture), followed by Spain (19 per cent), China (16 per cent), Germany (11 per cent) and Slovakia (9 per cent). Global exports of pethidine remained stable, amounting to 4.4 tons in 2009. Spain, the principal exporting country, and Slovakia together accounted for about 50 per cent of global exports (1.5 tons and 685 kg respectively). Canada was the main importing country of pethidine in 2009 (489 kg), followed by South Africa (348 kg), Switzerland (301 kg), Germany (288 kg) and Austria (122 kg). Table XVI.4 provides further details on imports of pethidine.

Figure 30. Pethidine: global manufacture, consumption and stocks,[a] 1990-2009



[a]Stocks as at 31 December of each year.

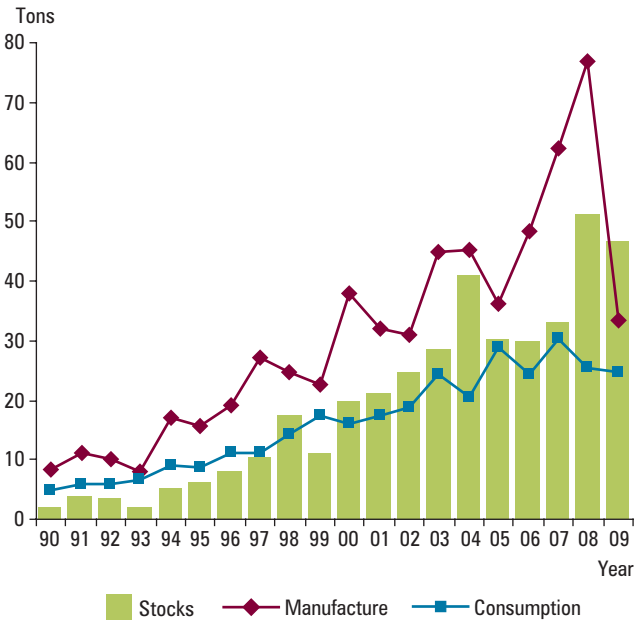
102. Pethidine consumption has followed a downward trend, reaching 9.9 tons in 2009 (corresponding to 24 million S-DDD). The United States and China were the main consumer countries, accounting for 36 and 24 per cent of global consumption respectively. In 2009, the countries and territories with the highest consumption of pethidine, in terms of defined daily doses for statistical purposes consumed per million inhabitants per day, were the Cayman Islands (457 S-DDD), the Bahamas (157 S-DDD) and Canada (137 S-DDD).

103. Global stocks of pethidine totalled 10.8 tons in 2009. The largest stocks were held by the United States (38 per cent of global stocks), Germany (21 per cent), Slovakia (7 per cent) and China (6 per cent).

Tilidine

104. Global tilidine manufacture reached a peak of 77.0 tons in 2008 and decreased to 33.5 tons in 2009, when Germany was the sole manufacturer (see figure 31). Tilidine exports totalled 4.8 tons in 2009. The two main exporters were Germany (65 per cent of global exports) and Ireland (34 per cent). The main importing countries of tilidine in 2009 were Belgium (2 tons) and Germany (1.6 tons). Three other countries imported tilidine in 2009 in quantities of more than 10 kg: Luxembourg (45 kg), Switzerland (45 kg) and South Africa (22 kg).

Figure 31. Tilidine: global manufacture, consumption and stocks,[a] 1990-2009



[a]Stocks as at 31 December of each year.

105. Global consumption of tilidine reached a record level of 30.2 tons in 2007 and then decreased to 24.7 tons (corresponding to 123 million S-DDD) in 2009. Most tilidine is consumed in Germany, which accounted for 87 per cent of the world total in 2009,

and Belgium (9 per cent). In 2009, the countries with the highest consumption of tilidine, in terms of defined daily doses for statistical purposes consumed per million inhabitants per day, were Germany (3,555 S-DDD) and Belgium (2,745 S-DDD). Global stocks of tilidine stood at 46.5 tons in 2009, the majority being held by Germany (81 per cent), followed by Belgium (14 per cent) and Italy (5 per cent).

Trimeperidine

106. The manufacture of trimeperidine amounted to 185 kg in 2009. India and the Russian Federation accounted for 72 per cent and 28 per cent of global manufacture respectively. India was the leading exporting country of trimeperidine in 2009 (116 kg), followed by Ukraine (27 kg). Most of the global consumption of trimeperidine in 2009 (totalling 296 kg, corresponding to 1.4 million S-DDD) took place in the Russian Federation (70 per cent) and Kazakhstan (13 per cent). The countries with the highest consumption, expressed in defined daily doses for statistical purposes per million inhabitants per day, were Kazakhstan (35 S-DDD), Belarus (22 S-DDD) and the Russian Federation (20 S-DDD). In 2009, global stocks amounted to 302 kg, with the Russian Federation reporting the largest share (76 per cent of the global total).

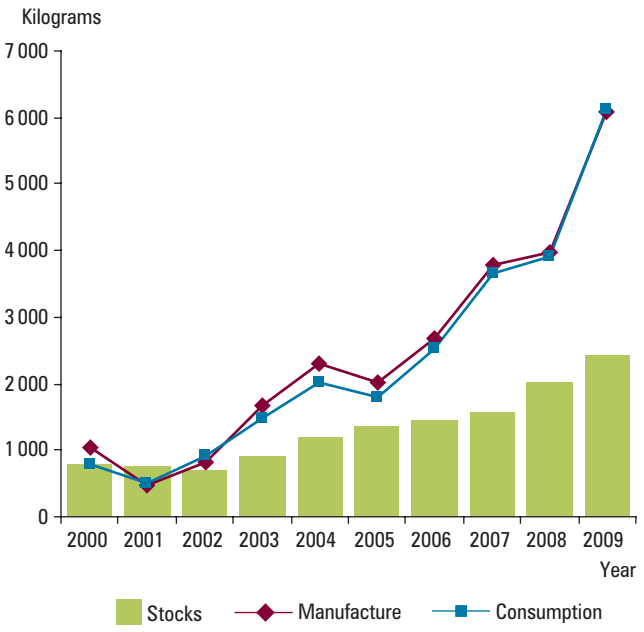
Opioid analgesics controlled under the 1971 Convention

107. Buprenorphine and pentazocine are opioid analgesics that are controlled under the 1971 Convention. Brief information on these opioids is included in the present publication. More detailed comments on statistics on buprenorphine and pentazocine can be found in the INCB technical report on psychotropic substances.[27]

Buprenorphine

108. Buprenorphine is an opioid used as an analgesic and in detoxification and substitution treatment of opioid dependence. Manufacture of the substance has increased steadily and significantly. In 2009, global manufacture reached 6.1 tons, nearly six times the amount manufactured 10 years earlier, in 2000 (see figure 32). The United Kingdom accounted for 86 per cent of global manufacture, followed by Belgium, the Czech Republic, the United States and China. The United Kingdom, Germany and Australia, in descending order of quantity exported, were the world's leading exporting countries of buprenorphine. The United States, Germany, France and the United Kingdom, in descending order of quantity imported, were the main importing countries of buprenorphine, accounting for 83 per cent of global imports. Some 70 other countries reported imports of buprenorphine in 2009.

Figure 32. Buprenorphine: global calculated consumption,[a] reported manufacture and stocks,[b] 2000-2009



[a]Approximate global consumption, calculated on the basis of the statistical data submitted by Governments.

[b]Stocks as at 31 December of each year; data are provided on a voluntary basis and may therefore be incomplete.

Pentazocine

109. Global reported manufacture of pentazocine averaged 4.5 tons per year during the period 1999-2008, India and Italy being the main manufacturing countries. As India did not report any manufacture for 2009, only 3 tons of pentazocine were reported as manufactured globally, nearly all of it by Italy. Italy exports most of the pentazocine that it manufactures, making it the world's leading exporting country. The leading importing country of pentazocine is the United States. Pakistan and the United States were the main consumer countries of the substance in 2009. Some 40 other countries regularly report imports of pentazocine.

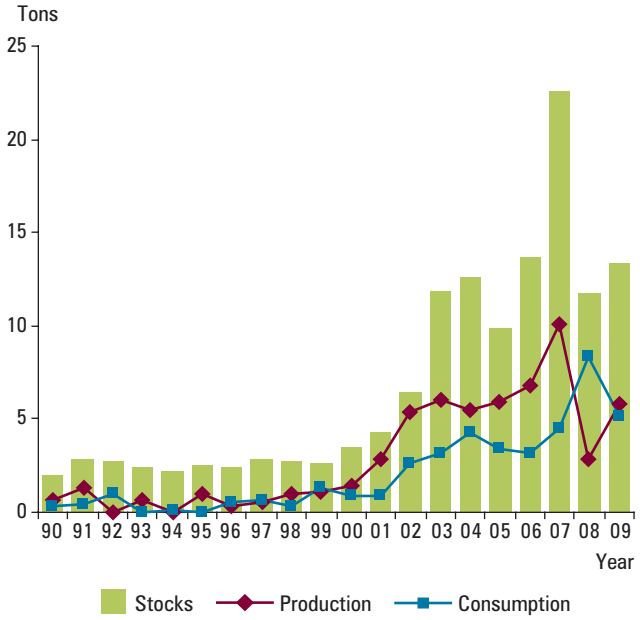
[27] *Psychotropic Substances: Statistics for 2009—Assessments of Annual Medical and Scientific Requirements for Substances in Schedules II, III and IV of the Convention on Psychotropic Substances of 1971* (United Nations publication, Sales No. T.11.XI.3).

Cannabis

110. Global licit production of cannabis grew steadily from 1.4 tons in 2000 to 5.3 tons in 2002 and then stabilized at a level of about 6 tons. After a sharp rise in 2007 (10.1 tons), global reported production of cannabis totalled 5.8 tons in 2009, of which Canada accounted for 3 tons, the United Kingdom for 2.6 tons, the Netherlands for 94 kg, Austria for 41 kg and the United States for less than 1 kg (see figure 33).

111. Prior to 2000, the United States had been the only country to report the use of cannabis solely for scientific purposes. Since then, other countries have used cannabis and cannabis extracts for scientific purposes. Cannabis has been consumed for medical purposes in Canada since 2001 and in the Netherlands since 2003. In the United Kingdom, cannabis is used mainly for the manufacture of cannabis extracts. Global use of cannabis and cannabis extracts[28] for medical and scientific purposes increased from 858 kg in 2000 to a peak of 8.3 tons in 2008. In 2009, global use stood at a level of 5.2 tons. The main user country in 2009 was Canada (4.8 tons), followed by the United Kingdom (130 kg), the Netherlands (109 kg), Austria (79 kg), Germany (27 kg), the United States (14 kg) and Spain (12 kg). Global stocks of cannabis fell sharply from 22.6 tons in 2007 to 13.4 tons in 2009, mainly because of a large decrease in stocks held by the United Kingdom. The countries reporting significant cannabis stocks in 2009 were the United Kingdom (10.7 tons),[29] the United States (1.2 tons), Switzerland (862 kg), Canada (497 kg) and Austria (125 kg).

Figure 33. Cannabis: global production, consumption and stocks,[a] 1990-2009



[a]Stocks as at 31 December of each year.

[28]In statistical reports to INCB, data on cannabis extracts are expressed in cannabis, using the following conversion factor: 1 kg of cannabis extract equals 7 kg of cannabis.

[29]This figure is being clarified with the Government concerned.

Coca leaf and cocaine

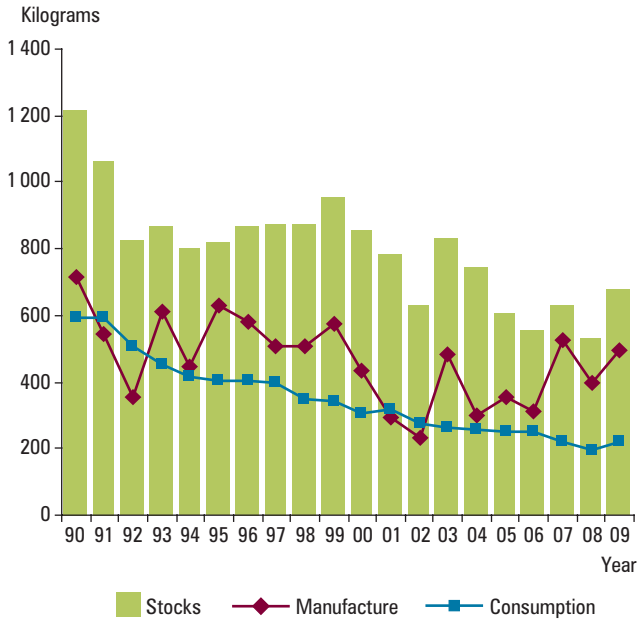
Coca leaf

112. Peru has been the only country exporting coca leaf for the global market since 2000. The United States is the leading importing country, accounting for 98 per cent of global imports. Imports by the United States declined from 175 tons in 2001 to 90.7 tons in 2009. Coca leaf is used in the United States for the extraction of flavouring agents and the manufacture of cocaine as a by-product. Such use fluctuated in the period 1990-2009, following a general downward trend. In 2009, 122 tons of coca leaf were used in the United States. In Peru, the amount of coca leaf used for the manufacture of cocaine increased from 20.3 tons in 2002 to 95.1 tons in 2009, the second highest quantity ever reported by that country. Small quantities of coca leaf were used in Italy, the Netherlands and Switzerland in recent years for the extraction of flavouring agents and, in France, for use in homeopathic medicines. Stocks of coca leaf held in the United States account for the majority of global stocks. In 2009, stocks held in that country amounted to 740 tons, or 86 per cent of the world total.

Cocaine

113. Global licit manufacture of cocaine declined continuously from a yearly average of 850 kg in the period

Figure 34. Cocaine: global manufacture, consumption and stocks,[a] 1990-2009



[a]Stocks as at 31 December of each year.

1987-1990 to 497 kg in 2009 (see figure 34). The main manufacturing countries in 2009 were Peru (449 kg) and the United States (45.3 kg). Until 2000, global exports of cocaine also followed a downward trend, totalling 211 kg in that year. Exports then picked up again, reaching 310 kg in 2009. Peru was the main supplier, at 220 kg, or 71 per cent of global exports in 2009. Exports from Peru in 2009 were destined mainly for the United Kingdom, where imported cocaine is purified and partly re-exported.

114. Global consumption of cocaine has followed a declining trend, from a yearly average of about 670 kg in the period 1987-1990 to 219 kg in 2009. In 2009, the United States remained the main consumer country of cocaine (71 kg, or 33 per cent of global consumption), followed by the United Kingdom (39.2 kg), Canada (16.5 kg) and the Netherlands (15.1 kg). Global stocks of cocaine stood at 680 kg in 2009. The countries holding the largest stocks were the United States (184 kg), Peru (163 kg) and the United Kingdom (161 kg).