

الصناعات الدوائية في سوريا

PHARMACEUTICAL INDUSTRIES IN SYRIA.



تاريخها, نشأتها ومراحل تطورها.

HISTORY, ORIGINS, AND STAGES OF DEVELOPMENT

History of the pharmaceutical industry

- The pharmaceutical industries in Syria emerged in the late sixties with the establishment of the Dimas and Tamiko laboratories, employing the most advanced scientific methods available at that time, while there were small rudimentary medicine production facilities that did not meet the criteria for true laboratories, these early efforts laid the foundation for industry's growth. By the mid-fifties, approximately six laboratories had been established, and these facilities, along with the two public sector laboratories met 6% of the country's medicine needs.



History of the pharmaceutical industry



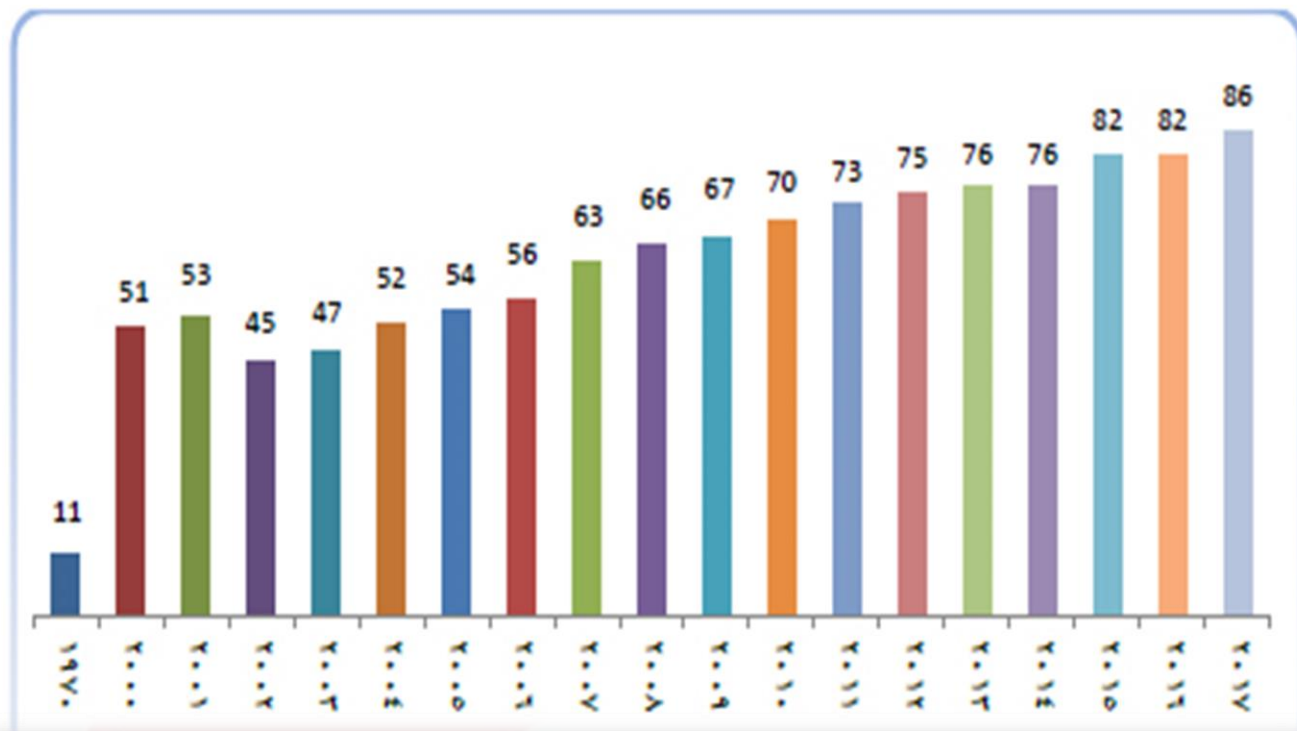
- After 1985, due to the economic blockade imposed on the country, the pharmaceutical supply became very difficult, as the coverage of the pharmaceutical market in Syria was only 18% of the actual need.
- The actual interest in manufacturing medicine and encouragement private investment in the sector marked the beginning of the second stage in the pharmaceutical industry's history. This stage, characterized by the strong entry of the private sector commenced in 1987, signifying the true era of pharmaceutical manufacturing in Syria.

Development of pharmaceutical industries

- The government began granting and encouraging licensing to private pharmaceutical companies, which significantly contributed to doubling the number of laboratories. In 1991, there were about 28 laboratories, this number increased to about 40 within two years and reached 58 producing laboratories by 2010. With continuous encouragement from the government, the number of producing laboratories reached 73 in 2018.

عدد المنشآت الدوائية المرخصة 2017-1970

1- Number of Local Medicine Factories (1970-2017)



Development of pharmaceutical industries

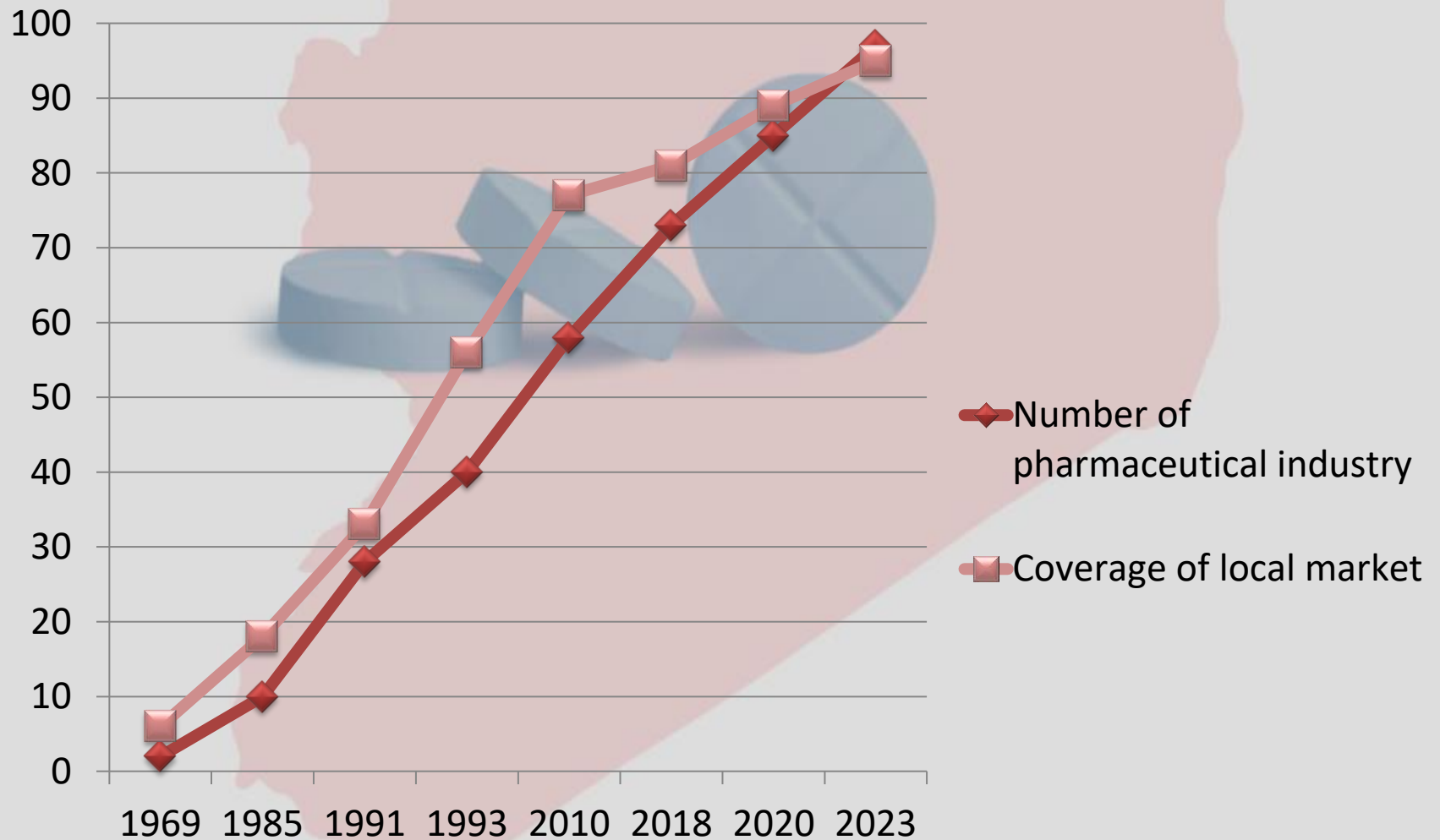
- The pharmaceutical industry was a beacon of investment success prior to the crisis, its prominence stemmed from its substantial economic returns and its pivotal role in ensuring national pharmaceutical security. The industry's production capacity met over 85% of local market demand.



Development of pharmaceutical industries

- The localization of advanced technologies and the comprehensive concept of quality, combined with the operation of the pharmaceutical sector and activation of auxiliary industries such as the manufacture of pharmaceutical media, cardboard, pharmaceutical glass, packaging, and so on, made it the most successful example of investment in Syria, as a result, pharmaceutical exports reached a volume of 220 million dollars in 2010.
- Syrian pharmaceutical companies made their mark began in the domestic healthcare market and then expanded abroad, becoming strong competitors among Arab pharmaceutical industries. This success reflects their dedication to quality and innovation.

Statistic of development the pharmaceutical industry



Providing requirements in the pharmaceutical industries

- The Ministry of Health implements a follow-up system for the medicinal products to thoroughly investigate any product-related complaints and collaborate with the producing laboratory to prevent future occurrences of such defects.
- The effectiveness of a drug product hinges on several factors, including:
 - 1) **Quality of the raw material:** the specifications of the raw material must strictly adhere to the standards outlined in the Pharmacopoeia.
 - 2) **Formulation:** the conversion of raw material into the pharmaceutical form that the patient takes is a crucial step in insuring drug efficacy.

Providing requirements in the pharmaceutical industries

- 3) Bioequivalence (generic drug equivalents): All locally manufactured medicines are generic equivalents of their global counterpart. These generic drugs must be capable of delivering the same concentration of the active ingredient as the original brand-name medications.
- Evaluating drug efficacy or identifying potential inefficacy requires the application of approved scientific standards.

Providing requirements in the pharmaceutical industries

- Considering that the medicines manufactured in Syria are generic equivalents and not original brands, the methods for monitoring generic medicines are based on standardized laboratory measurements including:
 - **Active ingredient quantification:** measuring the amount of active ingredient in the formulation.
 - **Dissolution and disintegration studies:** assessing the rate at which the drug dissolve and disintegrates in various media, mimicking the digestive process
 - **Physical property analysis:** evaluation the physical characteristics of the drug product, such as tablet size, shape, and weight.
 - **Stability testing:** assessing the stability of the drug product over time under different storage conditions to ensure its efficacy and safety throughout its shelf life.

Providing requirements in the pharmaceutical industries

- In addition to studying the conformity of raw materials to the constitutionally approved specifications, no starting material is imported unless it complies with the constitutional conditions. Upon completion of the pharmaceutical formulation, the stability of the pharmaceutical form is studied, and its first preparations are not released except after it is monitored centrally in the Ministry of Health and is followed up throughout the shelf life on the pharmaceutical shelf.
- By comparing Syrian pharmaceutical laboratories, we find that they all meet the requirements set by the Ministry of Health, but many of them exceeded these requirements to become compatible with the conditions required globally, especially modern varieties, and to meet export requests.

Applying international quality standards in the pharmaceutical industries

- Syrian pharmaceutical manufacturing companies have implemented the quality management system and good manufacturing practices as an effective approach to improving the quality of pharmaceutical products.
- The Ministry of Health collaborated with international organizations and laboratories in an effort to modernize the industry through legislation and laws, including the Good Manufacturing Practices (GMP) certificate, which was not approved in Syria before 1988. The ministry also adopted a series of ISO standards for both quality management systems (ISO9001) and product manufacturing, pharmacokinetics, storage conditions, and environmental management (ISO14001).

Applying international quality standards in the pharmaceutical industries

ISO **Experts** CENTER FOR



ضمان الجودة في المعامل الدوائية

Quality Assurance in Pharmaceutical Industries

Applying international quality standards in the pharmaceutical industries

- This commitment to quality has enabled Syrian pharmaceutical companies to establish a strong presence in the global market. Syrian pharmaceutical products are now exported to over 20 countries.
- The Syrian pharmaceutical industry is a testament to country's scientific and technical capabilities. Syrian pharmaceutical companies are committed to producing high-quality, affordable medicines that meet the needs of patients around the world.

Applying international quality standards in the pharmaceutical industries

- Manufacturing has contributed par excellence to raising the efficiency of local laboratories and speeding up the process of applying good manufacturing conditions for medicine, which made the Syrian medicine quickly establish its presence in foreign markets.
- During the ongoing export process for years, the Ministry of Health in Syria did not receive any negative comment on the quality of the Syrian medicine. On the contrary, we find that it has become the number one medicine in some Arab markets such as Iraq, Yemen and Sudan, and through studies of the markets and their expectations, Syrian medicine export revenues achieved first place among Syrian exports.

Challenges facing the pharmaceutical industries in Syria

- The pharmaceutical industry suffered severe damage to its infrastructure and production processes, resulting in the collapse of its production capacity.
- The question is: What are the challenges facing the pharmaceutical industry in Syria today?
- The Syrian pharmaceutical industry has faced several challenges, including inadequate infrastructure and limited investment in research and development. These difficulties can generally be classified into two categories: local and external.

Challenges facing the pharmaceutical industries in Syria

- Local challenges:

- 1) **The decline in the value of the Syrian pound:** One of the main challenges that the sector witnessed after the year 2011 was the absence of sufficient government support, which was exacerbated by the continuous decline in the value of the Syrian pound and the rise in production costs. The decline in the value of the currency made it difficult for manufacturers to obtain the US dollar that It is a must to buy raw materials. This scarcity of foreign currencies hindered the production process and exacerbated the general challenges that the sector suffered from.



Challenges facing the pharmaceutical industries in Syria

- Local challenges:

2) **Lack of energy resources:** Another major challenge facing pharmaceutical manufacturers in Syria is the scarcity of energy resources and the resulting sharp rise in prices. Although the government has passed laws to limit this, the support provided remains insufficient. Many manufacturing companies resorted to using electric generators, noting that the government provides manufacturers with certain quantities of petroleum derivatives at specified or subsidized prices.

3) **Loss of experienced professionals:** The industry suffered from the loss of skilled workers due to several factors, and therefore manufacturers were forced to replace highly qualified professionals, who were previously supervising production operations, with individuals with less experience and competencies.

Challenges facing the pharmaceutical industries in Syria

- External challenges:
 - 1) **Difficulty of importing:** The economic sanctions imposed on Syria placed major obstacles in the path of the pharmaceutical sector. Although they did not directly target the health sector, their impact on the pharmaceutical industry was significant. Pharmaceutical company owners are facing great difficulties in importing basic equipment and spare parts directly to Syria, and with the global rise in prices of raw materials due to the increase in global shipping fees in the wake of the Covid-19 pandemic, the costs of shipping them, and the challenges associated with their import have become enormous burdens on the pharmaceutical industries.

Challenges facing the pharmaceutical industries in Syria

- External challenges:
 - 2) **Decline in exports:** The decline in exports had an additional impact on the pharmaceutical industry, due to the difficulty of conducting international financial transactions. Thus, the number of countries to which Syrian companies export medicines has decreased significantly, from 56 countries in 2011 to only 14 countries in 2019. The main export destinations for Syrian medicines include Iraq, Lebanon, Sudan, Mauritania and Yemen.

Challenges facing the pharmaceutical industries in Syria

- Despite the challenges faced by the Syrian pharmaceutical industry, it constituted one of the most important investments in the quality manufacturing sector in the first decade of the current century.
- The Arab Union of Pharmaceuticals and Medical Supplies Manufacturers in Syria ranked second in exporting medicines in the Arab world after Jordan.
- That is, despite the war, the number of pharmaceutical factories increased by about 23%, which demonstrates the economic feasibility and urgent strategic need to support and develop this industry.

Plants and pharmaceutical industries in Syria

- Plants are considered an important source in the pharmaceutical industry, as the word “drug” is used to refer to medicines whose active ingredients are extracted from natural sources.
- Among the plants widespread in Syria, the extracts of which are used in the manufacture of medicines:

Plants and pharmaceutical industries in Syria

- Poppy plant: from which morphine is extracted, used as a powerful narcotic and pain reliever.
- Galega officinalis: a plant that contains guanidine, from which metformin is extracted. Metformin is known for its hypoglycemic and diuretic-stimulating properties. It was also used in the past to treat plague, stings, and snake bites.



Plants and pharmaceutical industries in Syria

- **Crotalaria plant:** a plant from which Monocrotaline is extracted and is used as a topical anti-tumor.



- **Anabasis aphylla Leafless plant:** a plant from which Anabasine is extracted, which is used as a skeletal muscle relaxant. This plant is widespread in the desert of Homs and Albukamal.



Plants and pharmaceutical industries in Syria

- **Vinca minor (alotka):** from which the compound vincristine is extracted, is used to stop the growth of cancer cells, it is therefore classified as a category of chemotherapy.
- **Artichoke, also known as Silybum marianum:** a plant from which Silymarin is extracted, and the extract of Milk thistle seeds is used to treat chronic inflammatory diseases of the liver and cirrhosis.



conclusion

- In conclusion, the pharmaceutical industry in Syria has proven its worth despite the difficulties it has experienced over the previous years.
- We are still trying to revive this industry and encourage it to rise from under the rubble of difficulties and challenges that continue to this day.

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