**[Saving lives](https://www.dawn.com/news/1851974/saving-lives)**

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SANITATION and immunisation stand as the most effective defences against disease, disability, and death caused by infectious diseases. As our population reels from public health diseases, neither individuals nor the government observe the basic principles of hygiene and sanitation. Overpopulation exacerbates these issues, straining civic resources and impacting public health.

Babies born to undernourished mothers are destined to die from preventable diseases even before they reach toddler age. Although early childhood vaccinations are offered free through the government’s Expanded Programme of Immunisation (EPI), their acceptance is inconsistent. Adults, too, are vulnerable to viruses or bacteria that can be prevented through vaccination.

Immunisation induces immunity against specific diseases. The selected bacteria or virus is modified, scientifically processed, and injected. It mimics the original disease, albeit mildly, and provokes the host immune system to produce antibodies that counter the infectious agent without causing the disease.

The history of vaccination began with smallpox. Older readers may remember the consequences of smallpox that killed, blinded, or disfigured millions everywhere. Medical history is replete with tales of this highly contagious disease that continued for centuries. In England, Edward Jenner’s ground-breaking experiment in 1796 involved using fluid from eruptions on the hands of a milkmaid who milked the udder of a cow that had pustules. He injected the fluid into an incision on the arm of a healthy boy and observed that his subject remained protected. He used his innovation in his native town, stemming the spread of smallpox.

The Covid-19 response underscored the critical role vaccines play.

The Latin word for cow is ‘vacca’, and cowpox is ‘vaccinia’; Jenner called this procedure vaccination. The process was subsequently refined and became mandatory globally. The last naturally occurring smallpox case was reported in Somalia in 1977. Routine smallpox vaccination ceased worldwide in 1980. Smallpox is the only ID to have been eradicated and is among the most remarkable of public health successes.

Efforts expanded to combat other IDs. Universal immunisation against Hepatitis B has saved millions from liver failure and liver cancer. Life-saving vaccines are available today against viral influenza, bacterial pneumonia, meningitis, tetanus, typhoid, and cholera. Shingles, caused by the herpes zoster virus, is reactivated chickenpox virus acquired in childhood. The reawakened virus often causes relentless pain but can be prevented with the shingles vaccines. The Human papillomavirus (which causes cervical cancer in women) is preventable with shots given during adolescence.

Childhood infections such as measles, mumps, rubella, chicken pox, diphtheria, and tetanus are vaccine-preventable. Polio, which killed or maimed thousands of children globally, has virtually ended through mass vaccination, with ongoing challenges in a few places including Afghanistan and Pakistan.

The Covid-19 pandemic was met with swift vaccine development, illustrating the critical role vaccines play in combating global health crises. Encouraging results from field trials of vaccines against malaria, dengue, and TB are in the development or testing phases. However, not all IDs are vaccine-preventable. While they are playing havoc globally, Hepatitis C and HIV elude attempts at vaccine production.

Modern vaccines are safe and generally effective, although some people may express side effects, like a slight fever or rash. An intriguing feature of the human immune system is the presence of ‘memory cells’. Even years later, a booster shot will awaken resting cells and enhance protection. The evidence of res­p­onse is the detection of measurable antibodies in the blood, but many such tests are not commercially available. Data on the efficacy of a vaccine is credible only if obtained through well-conducted human trials, validated, and published in reputable journals.

If at least two-thirds of a population is vaccinated during an outbreak, it will create a shield that will protect those who are not. Travellers heading to areas where a disease is endemic are advised to receive vaccinations. Pilgrims to Haj and Umrah are vulnerable to meningitis, influenza, or pneumonia and must receive these preventive shots.

Almost all vaccines in Pakistan are imported and hence expensive and erratically available, depending on their demand and import policies. Ironically, EPI vaccines for children are supported through international funding agencies, yet they are inadequately used.

Vaccines for specific infections must be prioritised but must not replace water, sanitation and hygiene. This is the responsibility of individuals and our municipalities.

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