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Viewpoints

The alarming need for universalising Oral Rehydration Therapy: How many more children must die?

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> *No other single medical breakthrough of the 20th century has had the potential to prevent so many deaths over such a short period of time and at so little cost — UNICEF 1987*

In the early 1900s, children under five accounted for 30% of all deaths. Remarkably, under-five mortality plummeted to less than 2% by the late 1990s, commemorating an epoch-making epidemiological transition from infectious diseases to non-communicable diseases, wherein heart disease and cancers replaced diarrhoea and pneumonia as the major killers.[1]

The phenomenal drop in diarrhoeal deaths is entirely the outcome of a global commitment to tackle life-threatening cholera with Oral Rehydration Therapy (ORT) between 1970 and 1990. WHO and UNICEF policies globally promoted mass ORT utilisation and caregiver education. Consequently, diarrhoeal deaths fell from 4.6 million to less than 1.5 million annually.[2] Despite the drop, diarrhoea continues to be the second leading killer of children under-five, constituting about 0.5 million deaths annually or 1,300 every day (more than AIDS and malaria combined), with 80% dying in Africa and South Asia alone.[3] ORT remains an unsung public health hero, underutilised to this day. We memorialise the fiftieth year of the pathbreaking ORT field trials in 1971, by highlighting the suboptimal ORT utilisation and its devastating implications in meeting the Sustainable Development Goals (SDGs) on global health.

The life-saving potential of ORT was first demonstrated during the 1971 Bangladesh Liberation War when a cholera epidemic hit a refugee camp housing 350,000 individuals. Dilip Mahalanabis, an Indian paediatrician, without access to intravenous solutions (mainstay for diarrhoea at that time), saved thousands by administering a sugar-salt solution.[4] Although experts were divided in their opinion about ORT—still in its early developmental stages—Mahalanabis brought down the mortality from ~30% to 2%. ORT needed another four years to seize the attention of the medical community through publications demonstrating its efficacy. By 1978, ORT was the topmost priority of WHO's global diarrhoeal diseases control program and was adopted by over 100 countries in the next decade.[4]

Many variants of ORT were attempted even before discovering the 'co-transport' phenomenon, wherein sugar enhances sodium absorption.[4] Although David Nalin and Richard Cash are credited for pioneering ORT, this 'simple solution' was the culmination of many decades of tantalising struggles by both bench-workers and clinicians globally. Ultimately, Mahalanabis's field trial drew global policy directives towards universal ORT.

Diarrhoeal diseases disproportionately affect low- and middle-income countries due to poor hygiene and sanitation. When the role of zinc was established in 2004, UNICEF and WHO jointly announced recommendations for low-income countries, promoting ORT with zinc along with continued feeding, which remains the UNICEF-WHO's recommended first-line treatment for acute diarrhoeal diseases. Nevertheless, UNICEF data from 2005–2008 showed that an alarmingly low proportion—29% in Africa, 32% in the Middle East and 33% in South Asia—of children under-five received ORT for diarrhoea.[3]

Although ORT is the most cost-effective treatment (100 times cheaper than intravenous therapy), its utilisation has stagnated over the past two decades in most countries, with coverage often remaining below 50%.[5] Even in India, the country that pioneered ORT on a massive scale, only 51% of children receive ORT for diarrhoea, much less than in Bangladesh (78%) and many African countries, including Kenya, Namibia, and Mozambique.[6] Moreover, only 13% of under-five children in India receive the WHO/UNICEF-recommended ORT-zinc combination. Only 20% in India receive zinc alone, half that in Bangladesh (41%).[3] Interestingly, the degree of ORT utilisation reflects the under-five mortality (per 1000 live births) due to diarrhoea in both the countries: 6.9 in Bangladesh vs 9.3 in India.[7]

Scaling up ORT coverage to 100% could prevent 93% of diarrhoea-related mortality.[8] However, the misplaced reverence for complex gadgetry continues to obstruct ORT's optimal utilisation. Antibiotic overprescription remains prominent despite limited utility in under-five diarrhoea.[9] Apart from the emergence of multidrug-resistant superbugs, childhood exposure to antibiotics can adversely affect the gut microbiome, causing superinfections and long-term complications in adulthood. About 62% of children receive antibiotics for diarrhoea in India, the world's leading consumer of antibiotics.[9] Even antidiarrheal drugs that reduce intestinal motility are contraindicated in children. Although severe dehydration often requires intravenous fluids, a meta-analysis reported that ORT is not only as effective as intravenous rehydration but also less risky.[10] For

every 25 children treated with ORT, only one would eventually require intravenous rehydration.[11] Healthcare providers often avoid ORT because it provides no financial incentive to physicians or the industry. Moreover, concerned parents seldom trust ORT alone and demand antibiotics or intravenous therapy.

Despite poor global progress, ORT utilisation has risen slightly (34% in 2000 to 43% in 2015) in the least developed countries with increased access.[12] However, efforts to bridge the urban-rural gap are slow. Similar gaps in access to ORT exist between the richest and poorest households in most regions, particularly in sub-Saharan Africa. Although population-based data on coverage remain scarce, isolated case studies in Brazil, Egypt, Mexico, and the Philippines confirm that increasing ORT coverage reduces mortality.[13] ORT was used extensively during the recent cholera outbreaks amidst humanitarian crises in Haiti, Yemen, and Bangladesh.[13]

SDG Target 3.2 aims to reduce under-five mortality to 25 per 1000 by 2030. Further, the 'Integrated Global Action Plan for the Prevention and Control of Pneumonia and Diarrhoea' aims to reduce diarrhoeal mortality to less than 1 per 1000 live births by 2025, reduce the incidence of severe diarrhoea by 75%, ensure 90% access to appropriate management and relevant vaccines, and achieve universal access to basic drinking water, adequate sanitation, and handwashing in healthcare facilities and homes by 2030.[14]

Intensive information, education, and communication campaigns like polio can boost ORT utilisation in prevalent regions. Reports suggest that sustained support for ORT directly increases usage; for example, Egypt's ORT awareness campaign in 1988 familiarised 96% of the mothers with ORT in two years, increasing domestic usage to over 50%. However, when the campaign was discontinued, ORT usage dropped to 34%.[12] Similar incidents in the Gambia and the Caribbean show that ORT usage declines without persistent social efforts.[12] Unfortunately, parents in many LMICs remain unaware of ORT partly because of poor marketing and lack of financial incentives. The state must promote ORT when market forces oppose it.

Rotavirus vaccination, recommended by WHO and CDC, is not relevant in countries with poor vaccination rates (<61%) and multiple causative agents. Improving hygiene and access to safe water is extremely cost-effective but a lengthy process. Therefore, as weaker health systems successfully adopt these preventive strategies, increasing ORT usage through multisectoral efforts is crucial. Non-governmental and aid organisations can increase the awareness and adoption of ORT by scaling up access in affected areas. Intense promotion of ORT at the community level succeeded in the 1980s; a similar strategy with ORT-zinc therapy would be possible now. Funded national programs make a difference; for example, a national programme launched in 1980 by former Mexican president de Gortari resulted in 86% of mothers learning to prepare and administer ORT correctly.

ORT—estimated to have saved over 70 million lives—ranks first among public health interventions that save the greatest numbers of children's lives.[12] While ORT is currently the only Indian contribution to the WHO Essential Medicines List, the tragic irony is that ORT is underused in India not for budgetary dearth but solely because of a trust deficit in low-cost remedies. The policy must mandate ORT for every case of diarrhoea in children and curb antibiotic use without evidence.

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AUTHOR CONTRIBUTIONS

Both authors participated in all stages of the manuscript development, provided critical feedback on the manuscript and have agreed to be accountable for all aspects of the work.

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CONFLICT OF INTEREST

The authors completed the ICMJE Unified Competing Interest form (available upon request from the corresponding author), and declare no conflicts of interest.

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