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SUBJECT: Consultative Workshop to Prioritize Interventions for Tackling the Issue of XDR-Typhoid in Sindh Province of Pakistan

Undersigned pleased to inform you that the report on the Stakeholders Consultative Workshop to Prioritize Interventions for Tackling the Issue of XDR-Typhoid in Sindh Province", held on 2nd and 3rd October at PC Hotel Karachi, has been finalized

The report provides key insights and recommendations for addressing XDR-Typhoid in Sindh and serves as a strategic guide for future interventions. You are requested to kindly review the report and share any feedback or suggestions that may strengthen our collective efforts in combating this pressing health challenge.

Please find the report attached for your perusal.


DIRECTOR GENERAL

HEALTH SERVICES SINDH @ HYDERABAD

CC to: -

- The Secretary to Government of Sindh, Health Department, Karachi
- PS to Minister for Health and Population Welfare Department Government of Sindh, Karachi

Report: Stakeholders' Consultative Workshop to Prioritize Interventions for Tackling the Issue of XDR-Typhoid in Sindh Province of Pakistan

Collaborating Partners: Directorate General Health Services Sindh,
U.S. Centres for Disease Control and Prevention (US CDC)
& Health Security Partners

Date: October 27, 2024

Success Story

The Directorate General Health Services Sindh, in collaboration with U.S. Centres for Disease Control and Prevention (US CDC) and Health Security Partners (HSP), achieved a remarkable milestone in October 2024 by organizing a groundbreaking two-day stakeholders' consultative workshop in Karachi to confront the critical challenge of extensively drug-resistant (XDR) typhoid fever in the province. This event brought together a diverse coalition of stakeholders from health, water & sanitation sectors, donors/partners and other relevant provincial authorities, creating a powerful and impactful platform for collaboration. Through thorough consultations throughout the workshop with experts from all sectors, 37 targeted interventions were identified, ultimately successfully honing in on 11 prioritized actions using multiple prioritization techniques. This collaborative effort not only ensured that the selected interventions were contextually relevant but also set the stage for impactful and actionable solutions.

Another significant triumph of the workshop was the establishment of a Technical Working Group (TWG) dedicated to spearheading the implementation of these vital strategies. The TWG will focus on enhancing surveillance systems, training healthcare workers, and promoting public awareness, all while fostering cross-sector collaboration. This monumental success lays a solid foundation for a coordinated response to XDR typhoid, instilling hope and determination among participants to make a lasting difference. With the first TWG meeting planned for January 2025, there is an optimistic outlook that these united efforts will lead to significant improvements in health outcomes, effectively combating XDR typhoid and safeguarding the well-being of vulnerable communities in Sindh.

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1 Context of Extensive Drug-Resistant (XDR) Typhoid in Pakistan

Typhoid fever, caused by *Salmonella enterica* serovar Typhi, poses a severe health threat in Pakistan, with rising cases of both multidrug-resistant (MDR) and extensively drug-resistant (XDR) strains. While MDR typhoid resists first-line antibiotics like chloramphenicol, ampicillin, and trimethoprim-sulfamethoxazole, XDR strains also resist third-generation cephalosporins, complicating treatment efforts significantly. As these resistant strains become more widespread, the need for effective strategies to address the typhoid burden in Pakistan is urgent.

Pakistan's high incidence of typhoid, particularly in children aged 2-15, is exacerbated by poor sanitation, overcrowding, and inadequate water infrastructure in urban areas, facilitating the spread of resistant strains like XDR typhoid. Informal settlements and high population density further drive transmission, making Pakistan a hub for this resistant strain, which has the potential risk to even spread internationally. Several cases of XDR typhoid fever have been reported in patients travelling from Pakistan to the USA, UK, and Canada¹. A lack of control over antibiotic sales and minimal stewardship also contributes to the growth of XDR typhoid, with a study showing that nearly 97% of antibiotics are dispensed without prescription, fostering misuse and resistance².

The recent XDR typhoid outbreak in Sindh between 2016 and 2019 highlighted critical gaps in surveillance and treatment protocols. Karachi alone saw over 14,000 cases, with significant cases in Hyderabad, leading to concern over potential international spread and co-epidemics, especially amid the COVID-19 pandemic. Clinical management of MDR and XDR typhoid is challenging due to limited antibiotic options and the need for more expensive treatments, like meropenem and azithromycin. Furthermore, while effective diagnostics are available, such as blood cultures and molecular testing, the cost and limited accessibility hinder their widespread use. The lack of timely and transparent data sharing further complicates efforts to manage and prevent typhoid, underscoring the need for a comprehensive and collaborative approach to combatting this public health crisis.

A comprehensive strategy involving vaccination, public awareness, and improved healthcare infrastructure is essential to manage and prevent the spread of MDR and XDR typhoid in Pakistan³. Therefore, it is recommended that local governments implement adequate sanitation measures and widespread immunization using the Tybbar-TCV vaccine to contain the local outbreak. This necessitates coordination across various entities such as water, sanitation, and hygiene (WASH), public health, transportation, and other government agencies.

2 Stakeholders' Consultative Workshop to Address the Issue of XDR Typhoid in Sindh Province of Pakistan

A national review was conducted on September 26, 2023, by the Ministry of National Health Services Regulations and Coordination and the National Institutes of Health (NIH), which the World Health

¹ Akram, Javed, Arsalan Shamim Khan, Hassan Ahmed Khan, Syed Amir Gilani, Shehla Javed Akram, Fridoon Jawad Ahmad, and Riffat Mehboob. "Extensively Drug-Resistant (XDR) Typhoid: Evolution, Prevention, and Its Management." *BioMed Research International* 2020 (May 2, 2020): 6432580. <https://doi.org/10.1155/2020/6432580>.

² Saleem, Zikria et al. "Sale of WHO AWaRe groups antibiotics without a prescription in Pakistan: a simulated client study." *Journal of pharmaceutical policy and practice* vol. 13 26. 3 Aug. 2020, doi:10.1186/s40545-020-00233-3

³ Irfan, B., Yasin, I., and Kirschner, D (2024). "Extensive Drug-Resistant Typhoid Fever Prevention and Management in Pakistan."

Organization (WHO), Pakistan convened with financial support from U.S. Centers for Disease Control and Prevention (US CDC).

Building upon the recommendation from the national review regarding establishing a provincial level coordination platform for data sharing and taking corrective actions, the Directorate General Health Services (DGHS) Sindh in collaboration with the US CDC and its implementing partner, Health Security Partners (HSP), hosted a stakeholders' consultative workshop in Karachi on 2-3 October 2024. The agenda of the workshop is attached as Annexure-I.

2.1 Objectives

The objectives of the workshop were as follows:

- Explore and prioritize actionable strategies aimed at the prevention and control of XDR typhoid fever in Sindh.
- Identify and rank 10 top-priority actions to inform a follow-on meeting, focusing on implementation planning.
- Formulate a technical working group (TWG) of experts and stakeholders who will oversee and guide the implementation of the prioritized interventions and identify the role of stakeholders in light of the decisions agreed upon during this meeting.

2.2 Participants

The workshop brought together key stakeholders from all relevant sectors to address the issue of controlling XDR typhoid in the province. Participants included representatives from the department of health, water and sanitation departments, the drug regulatory authority, water supply boards, water and sewerage authority, microbiologists from both the public and private sectors, National Institute of Health-Islamabad and other donors/partners working in Sindh province. In addition to technical experts, the political and bureaucratic leadership was also invited to contribute to the discussion, leading to decision making and implementation. The health minister and health secretary could not attend the workshop in person; however, they were briefed on the outcomes of the workshop at their office afterwards. A full list of participants is included in Annexure-II.

2.3 Voting Entities

To ensure equal weightage to inputs from each institution at the workshop, voting rights were assigned to institutions instead of each participant. Each institution had one vote, no matter how many participants were representing that institution. The rationale of this approach was to avoid any biases in ranking the interventions based on the number of participants present from any institution. Twelve voting entities were identified in advance of the workshop. Voter entity No. 7 was not utilized as no one from Liaquat University of Medical and Health Sciences could attend the workshop, therefore the activities were completed with data from 11 voters. Moreover, Karachi Water & Sewerage Board was assigned as Voter 2, Hyderabad Water Supply as Voter 3, Mayor Hyderabad as Voter 4 and Water and Sewerage Hyderabad as Voter 5. However, due to their unavailability at the workshop, their voting rights were transferred to other organizations i.e. Fleming Fund, WHO, NIH and UKHSA, respectively. This was done with the consensus of all participants, and it ensured that each participating institution, including donor and federal entities, had an equal voice in the decision-making process. The list of participants included in Annexure-II also has the voter number assigned to each institution participating in the workshop.

2.4 Prioritization Techniques

The following two prioritization techniques were used in the workshop to identify the top priority interventions.

2.4.1 Multi-Voting Technique

The multi-voting technique (MVT) is useful when a long list must be narrowed down to a top few. MVT was utilized to reduce the number of key actions that were longlisted. MVT consists of rounds of voting, where participants are given a certain number of votes to identify their highest priority items. The number of votes can be unlimited, or a maximum can be established. Rounds of voting continue until the list is narrowed to the desired number.

2.4.2 Prioritization Matrix

The prioritization matrix (PM) method is useful when items are considered against a large number of specified criteria. This method also accounts for criteria with varying degrees of importance. A matrix was created with key action items vertically and criteria horizontally and a column for the priority score.

3 Workshop Proceedings

3.1 Day 1: October 2, 2024

The workshop began with a warm welcome from Dr. Muhammad Asif, Additional Director, Provincial Disease Surveillance and Response Unit (PDSRU), followed by participants' brief introductions. Dr. Naveed Masood Memon, Additional Director, delivered opening remarks on behalf of the Directorate General Health Services Sindh, outlining the workshop's objectives and emphasizing the need for priority interventions and the formation of a Technical Working Group (TWG) to address XDR typhoid in Sindh. Dr. Elizabeth Davlantes, Deputy Chief of the Waterborne Disease Prevention Branch at the US Centers for Disease Control and Prevention (CDC), welcomed and thanked participants as well as shared an overview of the US CDC's efforts, including national and provincial-level workshops and their efforts in establishing a TWG. She also hinted at a potential pilot project to implement one of the priority interventions identified during the workshop. Following this, the speakers from key institutions delivered presentations on their work related to XDR typhoid.



Figure 1: Inaugural and introductory session of the workshop by Dr Muhammad Asif

3.1.1 Summary of National Review Meeting by WHO

Dr. Farah Sabih, National Professional Officer IHR, from WHO Country Office Pakistan shared the work of WHO as well as summary of the National Review Meeting (September 2023) on XDR Typhoid. She highlighted the significant public health challenges posed by the increasing incidence of drug-resistant typhoid. Since the first outbreak in 2016 in Hyderabad, Sindh, the disease has rapidly spread despite the national response efforts. The introduction of the typhoid conjugate vaccine (TCV) in 2020 and the establishment of typhoid sentinel surveillance sites have been key steps in controlling the spread, but gaps in diagnostic capacities, weak data integration, and limited antibiotic regulation have hindered progress. Dr. Sabih emphasized the need for stronger multisectoral coordination, with agencies such as the Ministry of National Health Services, provincial health departments, and international partners like WHO, CDC, and USAID, all playing crucial roles in surveillance, treatment, and prevention efforts.

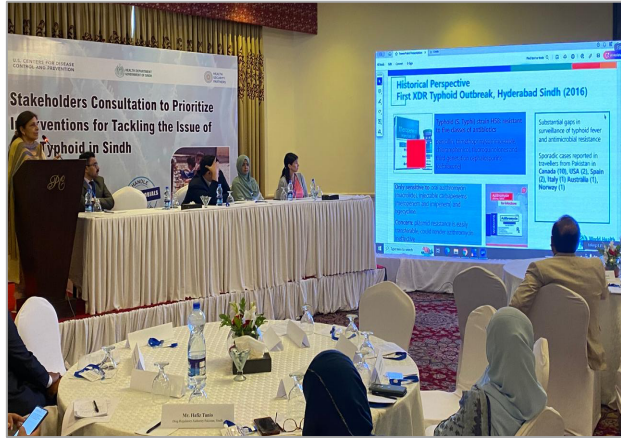


Figure 2: Presentation by Dr Farah Sabih from WHO

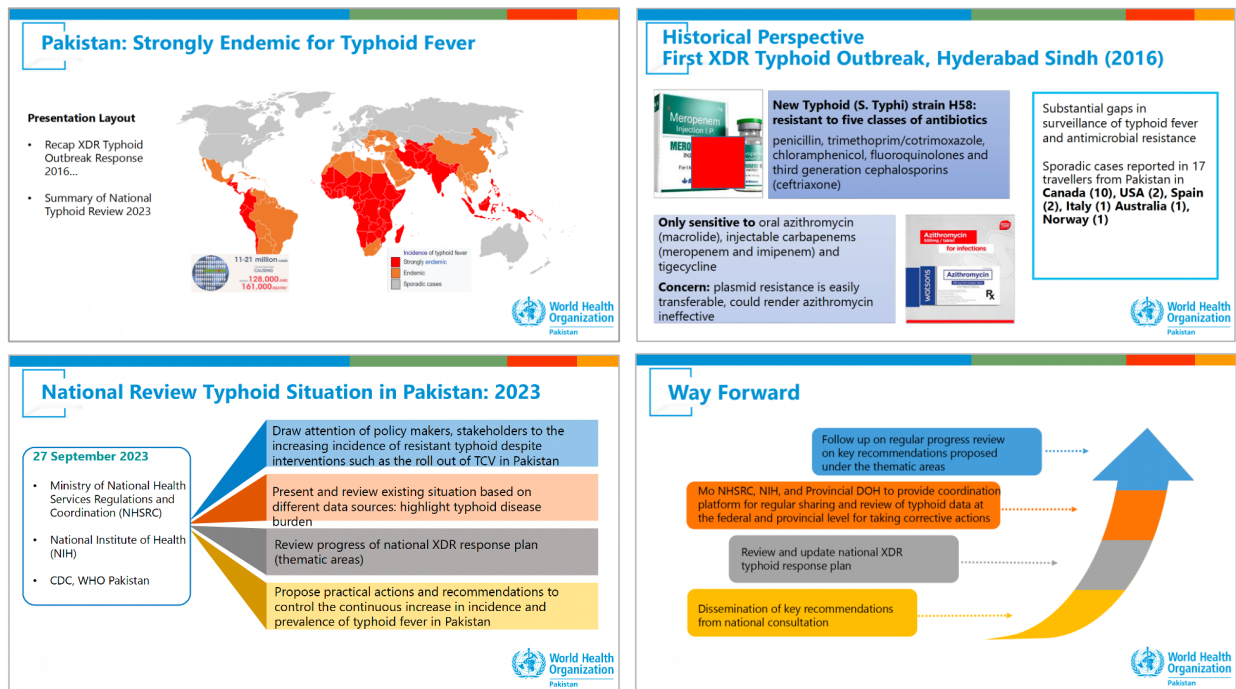


Figure 3: Glimpse of the presentation delivered by Dr Farah Sabih from WHO

The key challenges highlighted by Dr. Sabih included the need for more efficient integration of data from various surveillance systems, better coordination between water, sanitation, and hygiene (WASH) interventions, and stronger regulation of antibiotics to prevent misuse. The workshop underscored the importance of enhancing laboratory capacities for blood culture and antimicrobial susceptibility testing (AST), improving healthcare worker training, and ensuring regular reviews of the national XDR typhoid response plan. Going forward, Dr. Sabih called for increased political commitment, strengthened

regulatory actions, and improved WASH interventions as essential to controlling and eventually eliminating the spread of XDR typhoid in Pakistan.

3.1.2 AMR in Pakistan: Challenges and Way Forward by NIH

Dr. Muhammad Salman, the National Focal Person for AMR at the National Institute of Health, presented an overview of the AMR crisis in Pakistan, focusing on both the progress made and the challenges that remain. The country faces a high burden of MDR infections, particularly in pathogens like *S. Typhi*, *S. aureus*, and *A. baumannii*, leading to significant health risks and mortality. The misuse of antibiotics in human and animal sectors without proper regulation has worsened the situation. Despite some progress in AMR surveillance and the establishment of IPC guidelines, their implementation remains limited, and hospital-acquired infections continue to rise. The 2016-17 outbreak of XDR Typhoid in Sindh highlighted the scale of AMR, exacerbated by poor infection control and water, sanitation, and hygiene (WASH) practices.



Figure 4: Presentation by Dr Muhammad Salman from NIH

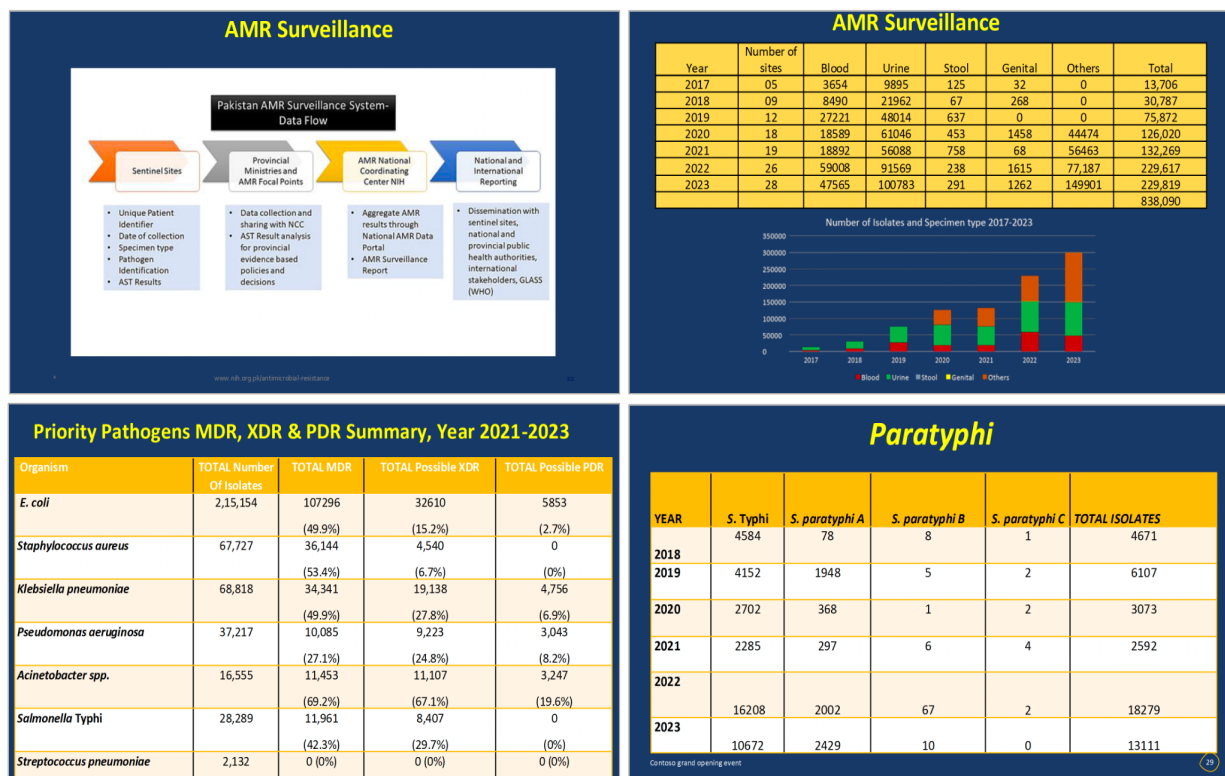


Figure 5: Glimpse of the presentation delivered by Dr Muhammad Salman from NIH

Dr. Salman emphasized the importance of a multi-sectoral approach to combat AMR, detailing the national action plan that includes surveillance, research, and regulatory frameworks such as the DRAP Act

of 2012⁴. The AMR governance structure, led by the Ministry of National Health Services, seeks to optimize the use of antimicrobials in both human and animal health through coordinated efforts. Key challenges include weak inter-sectoral coordination, lack of public awareness, and over-the-counter sale of antibiotics. To move forward, the focus must be on strengthening surveillance, expanding IPC programs, ensuring sustainable AMR stewardship, and increasing public and healthcare worker awareness.

3.1.3 Overview of XDR Typhoid in Sindh by DGHS Sindh

Dr Muhammad Asif, Additional Director, PDSRU, shared an overview of the situation in Sindh. Since 2016, Sindh, Pakistan, has experienced an outbreak of XDR typhoid fever, primarily affecting urban areas like Karachi. XDR typhoid is resistant to ampicillin, cotrimoxazole, chloramphenicol, fluoroquinolones, and third-generation cephalosporins, making treatment challenging. The disease predominantly affects children under 15 and spreads through contaminated water and poor sanitation, with case numbers peaking during the summer and monsoon seasons. In response, the PDSRU, DGHS Sindh established a surveillance system to collect data from hospitals and labs in Karachi and Hyderabad.

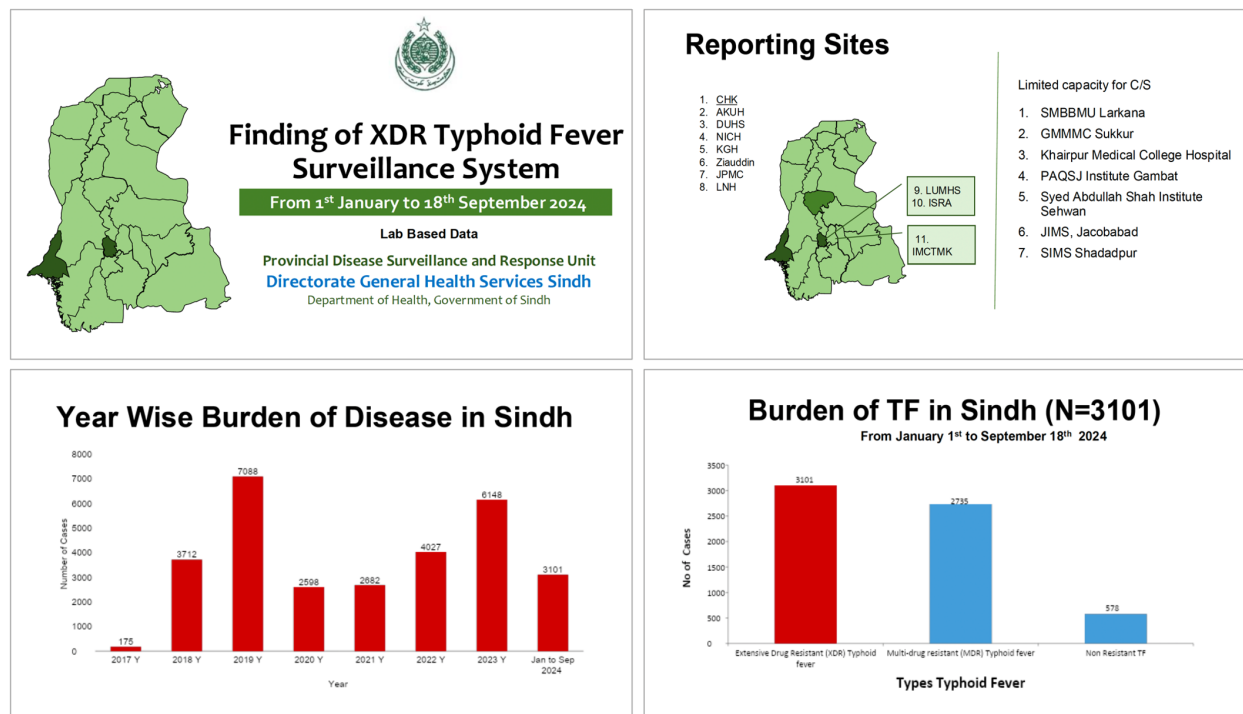


Figure 6: Glimpse of the presentation delivered by Dr Muhammad Asif from DGHS Sindh

From January 1 to September 18, 2024, 3,101 cases of typhoid were reported in Sindh, with specific areas like New Karachi and Orangi Town reporting over 100 XDR cases. The Typhoid Conjugate Vaccine (TCV) was introduced in Pakistan's Expanded Programme on Immunization (EPI) between 2019 and 2022 to help curb the outbreak. The vaccine campaigns in 2020 were effective as the cases of the XDR-Typhoid in that period significantly dropped as depicted in the figure below:

⁴ The Drug Regulatory Authority of Pakistan (DRAP) Act of 2012 is a significant regulatory framework in Pakistan designed to strengthen the oversight of drugs and medical products in the country. The Act was established to regulate the production, distribution, and sale of pharmaceuticals, aiming to improve the safety, efficacy, and quality of drugs, including antimicrobials, and combat issues like counterfeit drugs and the misuse of antibiotics.

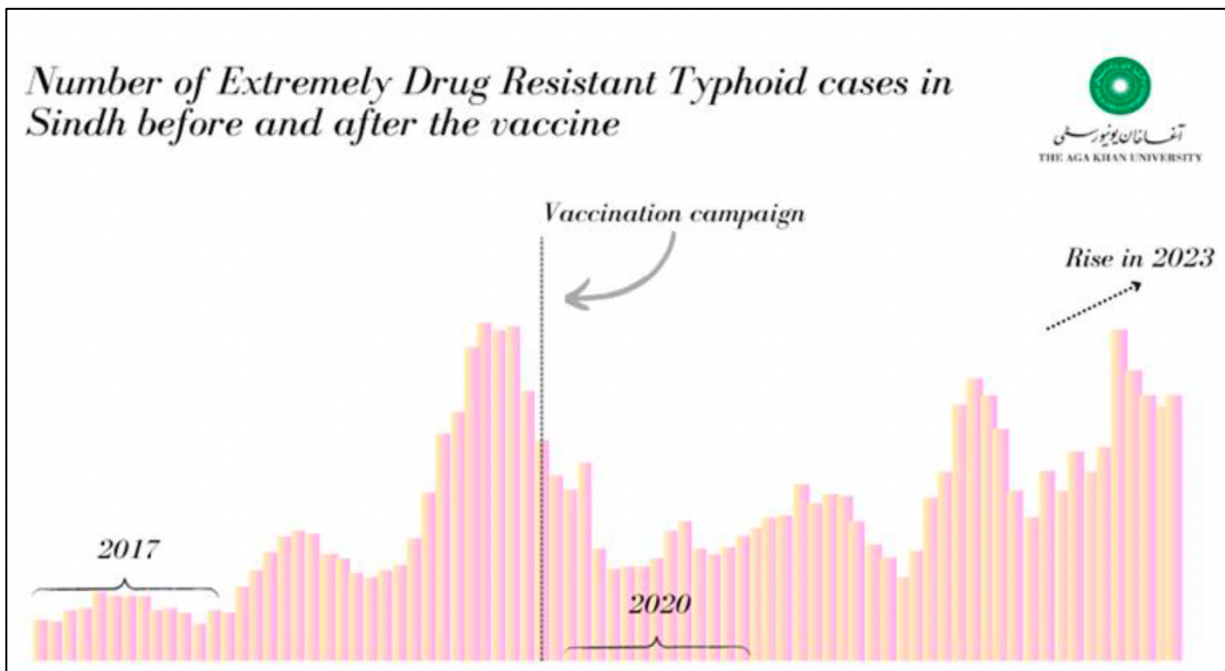


Figure 7: Impact of TCV

Despite these efforts, the XDR strain persists, exacerbated by inadequate sanitation, poor water quality, and the overuse of antibiotics. To combat XDR typhoid, key recommendations from his section included strengthening intersectoral coordination, improving the surveillance system, upgrading diagnostic labs, and ensuring safe drinking water through chlorination. Additionally, enforcing food safety regulations, implementing antibiotic stewardship programs, and regulating antibiotic sales were mentioned to be crucial in preventing further resistance. Regular water quality assessments and rational antibiotic use by healthcare providers are also necessary to control the spread of XDR typhoid.

3.1.4 Group Discussion: Contextualization and Brainstorming Session

The first group activity of the day started with reviewing and contextualizing the key action points from the National Review Meeting (September 2023). A total of 27 action points from the National Review were displayed on the screen and each point was discussed with participants for its contextualization for Sindh province. The language of the action points was updated and a total of nine points were dropped as those were specifically for the federal context. Eighteen (18) interventions were shortlisted from this activity.

Following this activity, a discussion session was conducted with the participants to brainstorm additional interventions specific for Sindh province. This session was vital as all participants, representing all relevant institutions, were provided an opportunity to share relevant interventions to their sector. Following the discussion on various ideas from all stakeholders, the participants submitted their ideas through an online platform (Mentimeter). Through the platform, all ideas of the participants were noted.

Moreover, Dr. Elizabeth Davlantes also shared a list of proposed interventions from CDC colleagues, and these together with the other participants ideas were reviewed. A review of the proposed ideas resulted in some being combined with others, some being discarded, and some being refined. The facilitators of the workshop noted all the points and compiled the list of proposed interventions from the activity.

3.1.5 Prioritization Exercise #1: Multi-Voting Technique

A total of 37 interventions were compiled and considered for the next group activity which was to narrow down the list to 10 key actions through the multi-voting technique. The participants, grouped as 11 voters, were provided a sheet on which all 37 interventions were written. The participants were asked to rate all the interventions on the scale of 0-20. 0 being the least important and 20 as the most important or top priority. All 11 data sheets were filled by the groups and handed over to facilitators.

The facilitators instantly compiled and processed the data in an excel sheet and identified the top 20 interventions with highest score. These 20 priority interventions were transferred to a new data sheet for round 2 of the MVT. All 11 voters were provided the sheet for round 2 with the same scale of 0-20. All groups filled the sheets and handed over to facilitators for compilation and data processing. By the end of round 2 of MVT, the facilitators were able to identify the top 10 interventions by the participants.

With this group activity, Day 1 of the workshop came to an end.

3.2 Day 2: October 2, 2024

Day 2 started with a brief recap of the activities on Day 1. After a brief discussion on the activities completed on the 1st day of the workshop, the facilitators commenced the group activity for the day.

3.2.1 Prioritization Exercise #2: Introduce and Weight Criteria

The 1st activity of the day started with introduction of the criteria for ranking the interventions. The following five criteria were introduced to the participants:

- Acceptability
- Effectiveness
- Impact
- Cost
- Feasibility

The participants, 11 voters as groups, were asked to distribute 100% weight among these 5 criteria as per their experience and perceived importance. Although, assigning a flat 20% weightage to each criterion was an option but as the participants belonged to wide range of institutions and their circumstances were different than each other, it was decided during designing the workshop that the criteria weightage should be finalized during the workshop to accommodate the priorities of each stakeholder.

Again, the Mentimeter platform was used for recording the data from the voters. The system averaged the voters' weightages for each criterion and normalized the sum of criteria weights to equal 100%. The compiled data from the participants, with weightage to each criterion, is as follows:

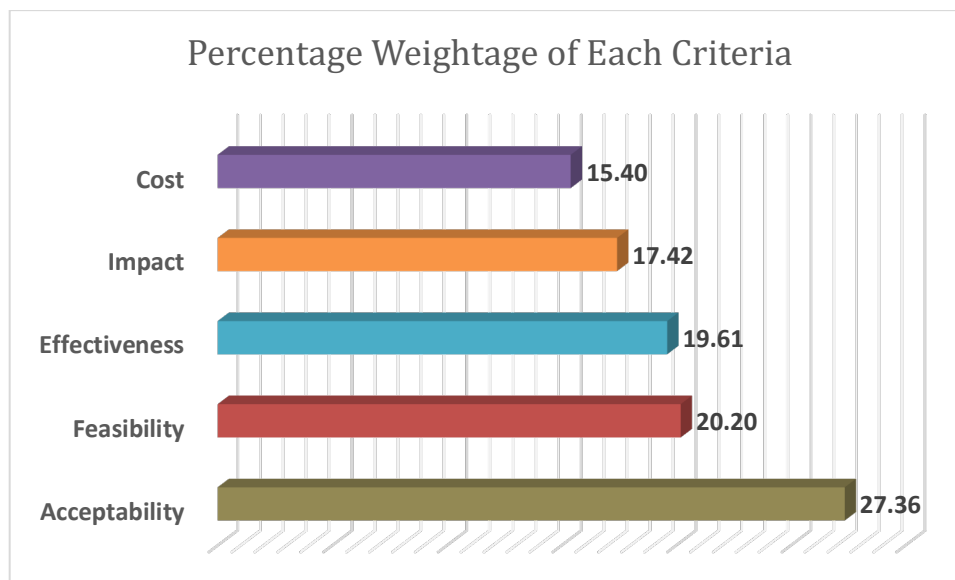


Figure 8: Percentage weightage assigned to each criterion as per the participants' data submission

3.2.2 Prioritization Exercise #3: Rate Key Actions Against Weighted Criteria

The participants were provided the top 10 interventions selected through the MVT on day 1. The participants, 11 voters as groups, were asked to score each intervention using the scale (1 to 3) provided in the given prioritization matrix (see Annexure III for criteria scale and definitions). The facilitators collected the data sheets for data compilation and processing. The scores (1-3) were summarized for each of the five criteria and these scores were multiplied by their weight to obtain a “priority score” for each key action. The priority score was then used to rank the key actions 1 to 10.

3.2.3 Group Discussion: Consensus on the Ranking of the Interventions

The top 10 ranked interventions were shared with the participants for discussion and consensus. The participants liked and appreciated the ranked interventions being the top priority. However, it was proposed to merge two interventions from one domain into one and add interventions related to TCV vaccination and capacity building of the healthcare providers. The proposal was thoroughly discussed and finally it was decided to add these two proposed areas as well. Therefore, the overall number of priority interventions increased to 11 from 10. Because the tenth and eleventh listed interventions failed to undergo the weighted ranking process, these two interventions effectively are equal in priority (i.e., “tied” for tenth place).

The list of the top ranked interventions for tackling the issue of XDR typhoid in Sindh is as follows:

1. Enforce restrictions on the dispensing and sale of antibiotics without valid prescriptions. Raise awareness among healthcare providers and patients on the proper use of antibiotics.
2. Ensure access to safe drinking water at all levels, including communities, healthcare facilities, districts, and province wide.
3. Develop a response plan based on identified priorities and outline key activities for its operationalization. Disseminate the plan as policy guidance to all relevant stakeholders.
4. Develop and update guidelines on typhoid case management, including diagnostics, and share them with all key stakeholders.

5. Implement strict hand hygiene protocols for food handlers to prevent the spread of infection.
6. Develop and disseminate uniform messages and IEC (Information, Education, Communication) materials on early detection and referral of suspected typhoid cases, safe water practices, sanitation, food safety, and vaccination.
7. Establish and scale up surveillance systems for typhoid through the identification of reporting sites. Create a unified reporting template that incorporates data from sectors like WASH, food safety, DRAP, and the AMR dashboard, ensuring proper data sharing.
8. Expand sentinel sites for typhoid surveillance, diagnosis, and treatment of XDR-TF at the district and tertiary levels.
9. Implement standardized laboratory testing protocols for accurate typhoid diagnostics.
10. Extend the use of typhoid conjugate vaccine (TCV) to cover high-risk groups and all age categories.
11. Roll out an integrated training package for the capacity building of healthcare workers.

Owning the work of the workshop, the Directorate General of Health Services Sindh has notified these interventions and shared with all relevant stakeholders for aligning their line of action with these interventions. The notification is attached as Annexure-IV.

3.2.4 Discussion and Constitution of the Technical Working Group

The final session of the day was to discuss the constitution of the TWG and its terms of reference (ToRs) for initiating work on tackling the issue of XDR typhoid in the province. A draft list of stakeholders and draft ToRs were shared with the participants for initiating the discussion. The participants collectively reviewed the provided documents and shared their feedback. It was decided that TWG will take a lead role in implementing a comprehensive strategy to control XDR typhoid, focusing on surveillance, guideline development, training, public awareness, and cross-sector collaboration. The TWG will advise and oversee the establishment of surveillance systems to monitor cases and hotspots, standardize diagnostic and treatment protocols, and organize training for healthcare providers. Public awareness campaigns will be conducted to promote preventive practices, with coordinated efforts alongside WASH and food safety sectors. The TWG will ensure effective data sharing, conduct regular reviews, support research initiatives, and adapt strategies as needed to strengthen the national and provincial response to XDR typhoid.

Following the workshop, the TWG has been successfully constituted and notified by the Directorate General of Health Services Sindh. The notification of the TWG, with detailed ToRs and members, is attached as Annexure-V.

3.2.5 Concluding Session and Meeting Evaluation

Dr. Elizabeth Davlantes thanked the participants for active participation in the event and delivered the closing remarks. She concluded the session with the remarks that the rising incidence of XDR typhoid in Pakistan, particularly in Sindh province, presents a significant public health challenge that demanded immediate and coordinated action. This workshop provided a crucial platform to bring stakeholders from various sectors together and prioritize actionable strategies aimed at combating this pressing health crisis. The prioritized interventions encompass a multi-faceted approach, addressing issues from antibiotic regulation to water sanitation, healthcare worker training, and public awareness. The formation of a TWG to oversee the implementation of these strategies marks a pivotal step toward a more coordinated response. By fostering cross-sector collaboration, enhancing data sharing, and implementing targeted public health initiatives, the TWG will play a vital role in mitigating the impact of XDR typhoid in Sindh.



Figure 9: Closing remarks from Dr Elizabeth Davlantes from US CDC

The closing activity of the day was to evaluate the execution of the workshop and its effectiveness. Using the Mentimeter platform, the feedback of participants was recorded, and the findings showed that participants agreed with the statements that the workshop objectives were clear, effective and achieved the desired results. Additionally, the participants felt the tools for the prioritization exercises were somewhat effective and somewhat easy to use; the prioritization criteria were appropriate and complete and useful for identifying actionable strategies to prevent and control XDR typhoid fever. Lastly, the participants agreed that the process allowed diverse opinions to be represented and that the facilitators were effective at guiding the group to consensus. The participants were also asked for suggestions for improvements. Full evaluation results are available in Annexure VI.

Day 2 of the workshop ended with a group photo of the participants.



4 Way Forward

As Pakistan continues to confront the challenges posed by XDR typhoid, it is imperative that all stakeholders remain committed to executing the prioritized actions and adapting strategies as necessary. Strengthened political commitment, regulatory enforcement, and community engagement will be crucial in reversing the tide of antimicrobial resistance and ultimately safeguarding public health. Continued monitoring and evaluation of the implemented strategies will be essential to ensure their effectiveness and to make necessary adjustments in response to evolving challenges.

Following the workshop, the interventions have been notified to all stakeholders and the TWG has been constituted and notified by the Directorate General of Health Services Sindh. The first meeting of the TWG is planned in January 2025 that will serve as an important platform for reviewing progress, refining action plans, and mobilizing resources necessary for the successful implementation of the identified strategies. Through continued commitment and coordinated efforts among all stakeholders, there is hope for effectively combating XDR typhoid in Sindh, ultimately contributing to improved public health outcomes in Pakistan.

5 Annexures

Annexure I: Agenda of the workshop

Day	Timing	Agenda	Responsible
1	8:30-9:00	Registration	Mr. Muhammad Faheem
	9:00-9:05	Recitation of the Quran	Dr. Muhammad Asif Syed, Directorate General Health Services (DGHS) Sindh
	9:05-9:45	Introduction of Participants	All
	9:45-10:00	Opening remarks and review of objectives	Dr. Waqar Mehmood, Director General, DGHS Sindh
	10:00-10:10	Opening remarks	Dr. Elizabeth Davlantes, US CDC
	10:10-10:30	Summary of National Review Meeting	Dr. Farah Sabih, WHO
	10:30-10:45	Coffee Break	
	10:40-11:00	AMR in Pakistan: Challenges and Way Forward	Dr. Muhammad Salman, NIH- Islamabad
	11:00-11:20	Presentation on XDR Typhoid in Sindh and Overview of Meeting Outputs and Methods	Dr. Muhammad Asif Syed, DGHS Sindh
	11:20-13:00	Group Discussion: Refine key actions list and identify key actions not found in National Review, but that should be considered for prioritization: <ol style="list-style-type: none"> 1. Review key actions up for prioritization 2. Individuals brainstorming on their own for missing key actions 3. All potential key actions are put up for everyone to view 4. List is simplified (similar items are grouped/condensed or duplicates are removed) 	Facilitators
	13:00-14:00	Lunch	
	14:00-15:30	Prioritization Exercise #1 Use multi-voting technique to narrow list of key actions for prioritization to 10 total. <ol style="list-style-type: none"> 1. Round 1 Vote 2. Round 2 Vote 3. Round 3 Vote (as needed) 	Facilitators

	15:30-15:45	Coffee Break	
	15:45-17:00	Prioritization Exercise #2: Introduce and Weight Criteria	Facilitators
	17:00-17:15	Next steps/Plan for Day 2	

Day	Timing	Agenda	Responsible
2	9:00-9:30	Review of Previous Day's Accomplishments: <ul style="list-style-type: none"> Narrowed List for Prioritization Weighted Criteria 	Dr. Muhammad Asif Syed, DGHS Sindh
	9:30-10:30	Prioritization Exercise #3: Rate key actions against weighted criteria. <ul style="list-style-type: none"> Review evidence/information to inform prioritization 	Facilitators
	10:30-10:45	Coffee Break	
	10:45-13:00	Prioritization Exercise #3 Continued	Facilitators
	13:00-14:00	Lunch	
	14:00-15:00	Presentation of Prioritized List and Discussion to obtain consensus on the ranking of the key actions <ul style="list-style-type: none"> Was this what you expected? Are there any obvious issues with the ranking? 	Facilitators
	15:00-15:30	Next Steps <ul style="list-style-type: none"> Formation of TWG Meeting to operationalize prioritized key actions Piloting key actions through USG investment 	Dr. Asif Syed, DGHS Sindh and Muhammad Faheem, HSP
	15:30-15:45	Coffee Break	
	15:45-16:00	Evaluation of Prioritization Process	Muhammad Faheem, HSP
	16:00-16:30	Closing Remarks and Group Picture	

Annexure II: Stakeholders' list for consultative workshop on prioritizing interventions for XDR typhoid

#	Name	Designation	Organization	Contact Number	Email address	Role
1	Dr Azra Fazal Pechuo	Provincial Health Minister	Health Department, Government of Sindh	021-99222957		Observer
2	Rehan Baloch	Provincial Health Secretary	Health Department, Government of Sindh	0300-2285080 021-99922201-2	sec.health@sindh.health.gov.pk	Observer
3	Murtaza Wahab Siddiqui	Mayor	Karachi Metropolitan Corporation	021-9921511-7	mayor@kmc.gos.pk	Voter-01
4	S.M Afzal Zaidi	Municipal Commissioner	KMC Karachi	021-992160387	mc.kmc@kmc.gos.pk	Voter-01
5	Syed Salahuddin Ahmed	Managing Director/ CEO	Karachi Water & Sewerage Board, Karachi	021-99245154-6	info@kwsb.gos.pk	Voter-02 (Unavailable)
6	Yahya Waseem Qurashi	Head Chemist	Karachi Water & Sewerage Board, Karachi	0334-1381529	Yahyawaseem25@gmail.com	Voter-02 (Only Day 2)
7	Dr Mehmood Iqbal	Provincial Team Lead	Fleming Fund Country Grant Pakistan	0333-2606667	Mahmood_iqbal@dai.com	Voter-02
8	Dr Fayyaz Ahmad	Senior Technical Advisor	Fleming Fund Country Grant Pakistan	0334-0090951	fayyaz_ahmad@dai.com	Voter-02
9	Dr Shandana Sabri	Provincial Program officer	Fleming Fund Country Grant Pakistan	0330-5740698	shandana_sabri@dai.com	Voter-02
10	Dr. Muhammad Salman	Chief Executive Officer	National Institutes of Health	0333 5403605		Voter-03 Speaker
11	Dr. Ali Rahman	PD IDSR	National Institutes of Health	0347-5196054		Voter-03
12	Dr. Mumtaz A Khan	Chief CDC	National Institutes of Health	0321-5714117		Voter-03
13	Dr. Nighat Murad	ED NIH	National Institutes of Health	0347-9132342		Voter-03
14	Dr. Mumtaz A Khan	Chief CDC	National Institutes of Health	0321-5714117		Voter-03
15	Dr Zahid Khemtio	MD WASA Hyderabad	Hyderabad Water Supply			Voter-03 (Unavailable)
16	Dr. Farah Sabih	National Professional Officer IHR/AMR	World Health Organization	051-8432400 0344-4277777	sabihf@who.int	Voter-04 Speaker
17	Dr Sara Salman	Head of Office, Sindh	World Health Organization	0301 8215838	salmans@who.int	Voter-04
18	Mirza Zeeshan Iqbal		UKHSA	03345269449	z.iqbalbaig@gmail.com	Voter-05
19	Kashif Ali Shoro	Mayor	Hyderabad Metropolitan Corporation	0300-3791125 022-3875500	informationhmc36@gmail.com	Voter-04 (Unavailable)

20	Muzaffar Hussain Memon	Managing Director	Water and Sewerage Authority, Hyderabad	022-9260232		Voter-05 (Unavailable)
21	Dr. Waqar Mehmood	Director General Health	Health Department, Government of Sindh	0334-2669854 022-9240101-6	dghealthsindh@yahoo.com	Voter-06
22	Dr. Samreen Ashraf	Deputy Director General	Health Department, Government of Sindh	0321-3021631 0222-671693	dghealthsindh@yahoo.com	Voter-06
23	Dr Naveed Masood Memon	Additional Director (IV)- CDC (Typhoid and others)	Health Department, Government of Sindh			Voter-06
24	Dr. Syed Muhammed Asif Shah	Additional Director PDSRU	Health Department, Government of Sindh	0333-2863477 022-9240101-6	asif.mph@gmail.com	Voter-06
25	Dr Ashraf Ali	Assistant Director MIS	Health Department, Government of Sindh	0301-3996424	dghealthsindh@yahoo.com	Voter-06
26	Dr M. Naeem	Program Director	EPI, Sindh	0300-3116359	sindh@epi.gov.pk	Voter-06
27	Faisal Imran	Microbiology Department	Liaquat University of Medical & Health Sciences Hyderabad	03332789050	Managerquality2018@gmail.com	Voter-07 (Unavailable)
28	Dr Farah Qamar	Head of Microbiology Department	Aga Khan Laboratory, Karachi	0300-2277965	farah.qamar@aku.edu	Voter-08
29	Awais Ahmed Juno	Assistant Director	Drug Regulatory Authority Pakistan (DRAP), Sindh	0333-2892695		Voter-09
30	Mr Hafiz Tunio	Chief Drug Inspector	Drug Regulatory Authority Pakistan (DRAP), Sindh	0300 3425208		Voter-09
31	Dr Ahson Qavi	Chief Executive Officer	Sindh Health Care Commission		Ceo_aqs@shcc.org.pk	Voter-10
32	Dr Zainab Hassan	Director	Sindh Health Care Commission	0300-3940622	ddt@shcc.org.pk	Voter-10
33	Dr Ahmed Ali Sheikh	Director Technical	Sindh Food Authority	0333 2388290		Voter-11
34	Dr. Muhammad Zaman Baloch	General Secretary	Pakistan Medical Association Sindh	0333 2655045	drdhrathi@gmail.com	Voter-12
35	Dr Farooq Tahir		Integral Global	0321 7654036		Facilitator
36	Dr Sobia Fatima		Integral Global			Facilitator
37	Dr Muhammad Afzal		CDC Country Office			Facilitator
38	Dr Elizabeth Davlantes	Waterborne Disease Prevention Branch	US CDC			Facilitator
39	Muhammad Faheem	Program Officer	Health Security Partners	0331-9998434	Muhammad@healthsecuritypartners.org	Facilitator

Annexure III: Prioritization Criteria

Acceptability (political, social, religious) – What factors will influence adoption?

- 3: High acceptability, involved parties would support adoption of this action
- 2: Neutral acceptability, intervention is unlikely to face obstacles
- 1: Low acceptability, involved parties likely to offer resistance to adoption of this action

Effectiveness – Is there evidence (scientific, clinical) to suggest the action will work?

- 3: Proven (literature – scientific or clinical exists) to be effective
- 2: Effectiveness is anecdotal
- 1: No evidence of effectiveness, anecdotal or otherwise

Impact – What size effect will the key action have to reduce cases, morbidity, and/or mortality?

- 3: Large reduction in cases, morbidity, and/or mortality
- 2: Moderate reduction in cases, morbidity, and/or mortality
- 1: Small to no reduction in cases, morbidity, and/or mortality


Cost – What financial resources are required for implementation, including initial investment, operational costs, and long-term sustainability?

- 3: Financial resources currently exist for implementation and maintenance
- 2: Financial resources partially exist for implementation and maintenance OR there are external resources that can be leveraged for implementation and maintenance
- 1: Financial resources are unlikely to be available now or in the future

Feasibility – How practical or achievable is it? Are the necessary resources (aside from cost, like staffing), infrastructure, and technical capacity available for successful implementation?

- 3: Very practical, easily achievable with current resources, infrastructure, and/or technical capacity
- 2: Practical and achievable but resources, infrastructure, and/or technical capacity is fully or partially lacking
- 1: Unlikely to be practical or achievable

Annexure IV: Notification of the priority interventions by Directorate General Health Services Sindh



NO.DGHSS/ (P&D-XDR) / - 27449/85
DIRECTORATE GENERAL
HEALTH SERVICES SINDH
Hyderabad Dated: 17-10-2024
E-mail: dghealthsindh@yahoo.com

To,

- Director General (Health), Federal Ministry of National Health
- Chief Executive Officer National Institutes of Health
- Mayor Karachi Metropolitan Corporation
- Mayor Hyderabad Metropolitan Corporation
- Chief Executive Officer Sindh Health Care Commission
- Managing Director/ CEO Karachi Water & Sewerage Board Karachi
- Managing Director Water and Sewerage Authority, Hyderabad
- Municipal Commissioner KMC Karachi
- Hyderabad Municipal Authority
- Deputy Director General Health Department, Government of Sindh
- Program Director EPI, Sindh
- Additional Director (IV)- CDC
- Additional Director PDSRU
- Chief Drug Inspector Drug Regulatory Authority Pakistan (DRAP), Sindh
- Director Technical Sindh Food Authority
- Assistant Director Drug Regulatory Authority Pakistan (DRAP), Sindh
- Head of Microbiology Department LUMHS
- Head of Microbiology Department Aga Khan Laboratory, Karachi
- Provincial Team Lead Fleming Fund Country Grant Pakistan
- Head of Office, Sindh World Health Organization
- General Secretary Pakistan Medical Association Sindh
- Representative of Integral Global
- Professor Dr Faraha, Aga Khan University
- WASH Lead UNICEF
- CDC Country Office

Subject: Prioritized Interventions Against XDR Typhoid Fever from Stakeholder Meeting

On the 2nd and 3rd October 2024, a stakeholder meeting was conducted with objective to prioritize interventions against the extensively drug-resistant typhoid fever (XDRTF) in the province. In the stakeholder meeting 11 key interventions were prioritized out of 27 which were identified on national review meeting conducted on September 26, 2023, by the Ministry of National Health Services Regulations and Coordination, National Institutes of Health in collaboration and World Health Organization Pakistan.

Below are the prioritized interventions:

1. Enforce restrictions on the dispensing and sale of antibiotics without valid prescriptions. Raise awareness among healthcare providers and patients on the proper use of antibiotics.
2. Ensure access to safe drinking water at all levels, including household, communities, healthcare facilities, all public and private places of districts, and province
3. Develop a response plan based on identified priorities and outline key activities for its operationalization. Disseminate the plan as policy guidance to all relevant stakeholders.
4. Update the guidelines on typhoid case management, including diagnostics, and share them with all key stakeholders.
5. Implement strict hand hygiene protocols for food handlers (all types) to prevent the spread of infection.



6. Develop and disseminate uniform messages and IEC (Information, Education, Communication) materials on early detection and referral of suspected typhoid cases, safe water practices, sanitation, food safety, and vaccination.
7. Establish and scale up surveillance systems for typhoid through the identification of reporting sites. Create a unified reporting template that incorporates data from sectors like WASH, food safety, DRAP, and the AMR dashboard, ensuring proper data sharing.
8. Expand sentinel sites for typhoid surveillance, diagnosis, and treatment of XDR-TF at the district and tertiary levels.
9. Implement standardized laboratory testing protocols for accurate typhoid diagnostics.
10. Extend the use of typhoid conjugate vaccine (TCV) to cover high-risk groups and all age categories.
11. Roll out an integrated training package for the capacity building of healthcare workers.


Department of Health believe that your cooperation and commitment will be invaluable in the successful implementation of these interventions.

DIRECTOR GENERAL
HEALTH SERVICES SINDH @ HYDERABAD

CC to: -

- The Secretary to Government of Sindh, Health Department, Karachi
- The Director Health Services _____ All Division
- PS to Minister for Health and Population Welfare Department Government of Sindh, Karachi

Annexure V: Notification of the TWG by Directorate General Health Services Sindh



NO.DGHSS/ #55 (P&D) XDR /-27486/45
 DIRECTORATE GENERAL
 HEALTH SERVICES SINDH
 Hyderabad Dated: 17-10-2024
 E-mail: dghealthsindh@yahoo.com

Notification

Director General Health Services Sindh, is pleased to constitute and notify a "Technical Working Group for Extensive Drug-Resistant Typhoid Fever under the following composition with terms of reference (TORs) as mentioned below:

Sl. No.	Designation	Organization	Role
1	Director General Health	Director General Health Services Sindh	Chairperson
2	Focal Person XDRTF	PDSRU Health Department	Co-chairperson
3	Representative	Sindh Health Care Commission	Co-chairperson
4	Representative	Deputy DG Communicable Disease Control	Member
5	Representative	Deputy DG Health Education	Member
6	Additional Director CDC (IV)	Health Department	Member
7	Prof: Dr Farah Qamar	Aga Khan University	Member
8	Representative	PPHI	Member
9	Representative	Mayor Karachi	Member
10	Representative	Mayor Hyderabad	Member
11	Representative	Karachi Water & Sewerage Board	Member
12	Representative	Hyderabad Development Authority	Member
13	Representative	Water and Sewerage Authority Hyd	Member
14	Representative	Commissioner Karachi	Member
15	Representative	Commissioner Hyderabad	Member
16	Representative	Microbiologist @ Aga Khan University	Member
17	Representative	Drug Regulatory Authority of Pakistan	Member
18	Representative	Chief Drug Inspector	Member
19	Representative	World Health Organization	Member
20	Representative	UNICEF	Member
21	Representative	Program Director EPI, Sindh	Member
22	Representative	Sindh Food Authority	Member
23	Representative	Pakistan Medical Association Sindh	Member
24	Co-Opted		Member

Terms of Reference

1. Advise and oversee the development and implementation of surveillance mechanisms to monitor XDR typhoid cases (incidence and prevalence), identify high-risk populations, and geographical hotspots.
2. Develop and oversee implementation of guidelines for the diagnosis, treatment, and management of XDR typhoid fever including IPC practices based on national and international standards.
3. Support training opportunities for healthcare providers on standardized lab and treatment protocols for XDR TF through identification of resources and provision of technical assistance.



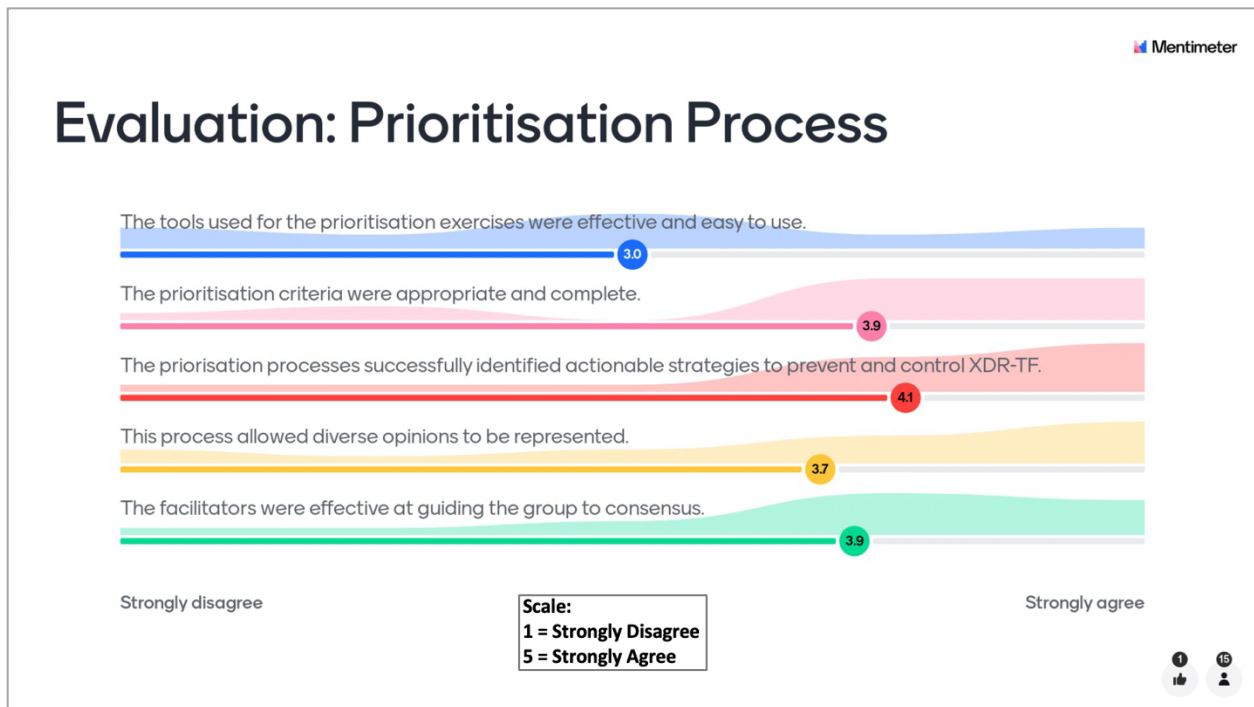
4. Develop and implement community awareness campaigns to educate the public about XDR typhoid prevention, including safe water practices, food safety and hygiene.
5. Coordinate with various sectors, including Water, Sanitation, and Hygiene (WASH), food safety, and environmental health, to ensure a multi-faceted approach to XDR typhoid prevention and control.
6. Establish data management hub and promote data sharing among relevant sectors to enhance surveillance and mitigation efforts.
7. Create a framework to monitor and evaluate the effectiveness of interventions against XDR typhoid, adjusting strategies as necessary based on findings.
8. Encourage research on XDR typhoid to fill knowledge gaps and inform best practices in prevention and management.
9. Conduct regular meetings to discuss progress, generate documented evidence, and share findings with higher authorities.
10. Identify the challenges encountered in implementing prevention and control activities of XDR Typhoid fever and propose evidence-based solutions. Further, periodically assess the implementation and impact of the interventions.
11. Review the XDR action plan to ensure that it is relevant and applicable to the specific context of Sindh.
12. Develop effective communication channels with federal health authorities and other provinces for a unified response to XDR typhoid fever.
13. The Director General of Health will be responsible for operationalizing the interventions as outlined in the Terms of Reference (TOR) and Technical Working Group (TWG).

DIRECTOR GENERAL
HEALTH SERVICES SINDH @ HYDERABAD

CC to:

- The Secretary to Government of Sindh, Health Department, Karachi
- The Director Health Services _____ All Division
- PS to Minister for Health and Population Welfare Department Government
- _____ All Concerned

Annexure-VI: Meeting evaluation results





How could the prioritisation process been improved?

Improving understanding of the process adopted

It can be improved by following the objectives presented in meeting

Points discussed may be shared with the group before final compilation.

Keeping view the previous strategies gaps/ and Action taken


Better back end support for characterisation of priorities into groups

I think it is tested tool by keeping more evidence against each intervention we can improve this

Modification of ranking system

By keeping view the previous strategies Gaps identified and Action takne.



How could the prioritisation process been improved?



With Discussion at every level and with all technical Personnel at the Gross root level.

The meeting is quit fruitful and help to eradicate X DR - Typhoid in sindh

Identification of high risk factor like triage

Discussion with all Multi Stakeholders at Provincial district level.

Discussion with all Multi Stakeholders at every level.

Mentimeter

Is there anything else you would like to add?

No

Continued Coordination with key stakeholders especially WASH should have been done to ensure their maximum presence for the meeting

Technical Working group should include the technical people for each thematic areas

NO

NA

Quarterly Review strategies should be reviewed at Provincial level.

Quarterly Strategic Review Meeting to watch the Progress

Most important !
Implementing these action points and evaluating them for further improvement.

