

### SWOT analysis table

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	Strengths	Weaknesses	Opportunities	Threats
<b>Project Details</b>	<ul style="list-style-type: none"> <li>Representation of all provinces</li> <li>Good representation from academia signifies innovation</li> <li>A higher proportion of internal and international funding as compared to national funding</li> <li>More internal funding shows interest from the sustainability perspective</li> <li>More focus on research and implementation n showcases competitiveness</li> <li>More representation from family medicine domain</li> <li>More digital health-based interventions focusing on noncommunicable diseases</li> <li>More interventions targeted at the general population as opposed to any particular age group</li> </ul>	<ul style="list-style-type: none"> <li>System development not at par with research focus which can impact scalability and sustainability</li> <li>The low representation of specialized field as compared to general health/family medicine.</li> <li>Lack of use of geospatial technology and analysis.</li> <li>Lack of big data sets hence resulting in less efficient data mining machine learning and artificial intelligence models.</li> <li>Two-thirds (66%) of the Pakistani population has functional phones, yet the majority of the interventions were smartphone based</li> <li>Lack of skilled human resources for digital health</li> </ul>	<ul style="list-style-type: none"> <li>A recent influx of digital health interventions in Pakistan in both implementation and research domain</li> <li>Capacity building opportunities for application system developers</li> <li>Opportunity for open source applications for high accessibility of digital health based interventions</li> <li>The higher opportunity of digital health working with different health domains, both pragmatic and research.</li> <li>Focus on neglected health outcomes like mental health.</li> <li>Higher opportunity to work in maternal newborn and child health</li> <li>Replication of successful digital health projects from other countries.</li> <li>More projects focusing on artificial intelligence/ machine learning models.</li> <li>Merging diverse Digital health components can provide more effective results</li> </ul>	<ul style="list-style-type: none"> <li>Unwillingness towards sharing data for impact maximization</li> <li>Most projects reflecting older/conventional technologies thus risking sustainability and scalability issues</li> <li>Higher in-house development limits value addition and impact</li> <li>More international funding may generate copyrights/IP issues</li> <li>Scarcity of funding</li> <li>Low conversion of digital health-based interventions for scale-up and commercialization.</li> <li>No policy for geospatial mapping at national level</li> <li>Lack of a clear understanding of digital health among key stakeholders.</li> <li>The high cost of digital health-based interventions.</li> <li>Lack of availability of data related to digital health interventions at national and provincial levels.</li> <li>Lack of infrastructure in basic/ primary health units and tertiary centers to</li> </ul>

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		<ul style="list-style-type: none"><li>• Low mobile phone network coverage in some areas</li></ul>		implement digital health interventions.
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	<ul style="list-style-type: none"> <li>• Balanced coverage of Interventions from all Socioeconomic classes</li> <li>• Application domains comparable to international trends showcase the relevance</li> <li>• Balanced representation of both technology hardware and software in digital health interventions</li> <li>• Increased technology interventions over time</li> <li>• Participant recruitment is more straight forward in Pakistan and thus not identified as a barrier</li> <li>• Scalability at the provincial /national level in most projects</li> <li>• High ratio of scale-up of completed projects</li>   <li>•Availability of technology infrastructure to scale digital health interventions Adequate resource allocations</li> </ul>	<ul style="list-style-type: none"> <li>• Absence of national digital health framework</li> </ul>	<p>and high impact (interoperability)</p>	
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	<p>(costs) to various intervention components</p> <ul style="list-style-type: none"> <li>• Presence of more open source applications</li> </ul>			
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<p><b>Project Team Details</b></p>	<ul style="list-style-type: none"> <li>• Diversity among professionals</li> </ul>	<ul style="list-style-type: none"> <li>• Less representation of regularized interventions</li> </ul>	<ul style="list-style-type: none"> <li>• Students' involvement can make them career-oriented</li> </ul>	<ul style="list-style-type: none"> <li>• Individual developers-led projects may lack the insight of a health care professional regarding healthcare needs and challenges and vice versa</li> </ul>
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	<ul style="list-style-type: none"> <li>• Reflects better collaboration The abundance of IT experts ensures intervention is technologically sound and has excellent reliability.</li> </ul>	<p>shows gaps at the governance level .</p> <ul style="list-style-type: none"> <li>• The low representation of individuals with a research background in the team, IT experts and clinicians may not have the skills to evaluate the impact of the project</li> </ul>	<ul style="list-style-type: none"> <li>• Towards digital health, medical, and engineering.</li> <li>• The curriculum should teach digital health and its significance Collaboration across sectors to utilize each other's expertise – including Academia, pragmatic and industry</li> <li>• More involvement professional from both Healthcare and Engineering in Digital health</li> </ul>	
<p><b>Project Evaluation</b></p>	<ul style="list-style-type: none"> <li>• A higher proportion of evaluation of studies/ projects for digital health</li> <li>• A high proportion of projects at scale up stage</li> </ul>	<ul style="list-style-type: none"> <li>• Data not reported or published at national or international forums</li> </ul>	<ul style="list-style-type: none"> <li>• Availability of relevant tools for study evaluations including big data.</li> <li>• Application of artificial intelligence/ machine learning in future digital health projects Installation and setup of app/project to a national database</li> </ul>	<ul style="list-style-type: none"> <li>• Reliance on conventional tools</li> <li>• Restricted access to projects to the national database</li> <li>• Risks arising from lack of structured programs/certifications for managing large data sets</li> <li>• Low evidence-based evaluation of digital health interventions</li> </ul>

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			<ul style="list-style-type: none"> <li>Commercialization / generalization of scale-up projects</li> <li>Stringent monitoring and reporting</li> </ul>	
<b>Ethics in Digital health</b>	<ul style="list-style-type: none"> <li>Responsiveness towards ethical requirements</li> <li>Data access restricted to relevant personnel</li> <li>Mindfulness towards data retention and archiving.</li> </ul>	<ul style="list-style-type: none"> <li>Around 1/10th (10%) of the studies/projects didn't administer consent</li> <li>The low representation of government regulators within regional ethical committees.</li> </ul>	<ul style="list-style-type: none"> <li>Standardization of consent forms and procedure</li> <li>The national body regulating ethical challenges related to digital health</li> <li>Develop regulations for formally initiating digital health projects.</li> </ul>	<ul style="list-style-type: none"> <li>Lack of proper ethical regulatory framework to determine if consent is required or not and data retention policy</li> <li>Local institute committee can influence/bias ethical decisions</li> </ul>