



# Evaluation of solar water supply systems in rural areas of Afghanistan (2016-2024)

## Evaluation Report

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## List of Acronyms

ACCLTS	Afghan Context Community-Led Total Sanitation
ACO	Afghanistan Country Office
AFCOSAN I	Afghanistan Conference on Sanitation
AWAP	Afghanistan Water Platform
AWD	Acute watery diarrhoea
CCAP	Citizen's Charter Afghanistan Programme
CCRI	Children's Climate Risk Index
CDCs	Community Development Councils
CEDAW	Convention on the Elimination of all Forms of Discrimination Against Women
CLTS	Community-led Total Sanitation
CP	Country Programme
CPD	Country Programme Document
CPE	Country Programme Evaluation
CRC	Convention on the Rights of the Child
CRPD	The Committee on the Rights of Persons with Disabilities
DoE	Department of Education
DRRD	Department of Rural Rehabilitation and Development
EM	Evaluation Manager
EPI	Expanded Programme of Immunization
ERG	Evaluation Reference Group
ESC	Evaluation Steering Committee
ET	Evaluation Team
FGDs	Focus Group Discussions
GBV	Gender-Based Violence
GD	Group Discussion
GDP	Gross Domestic Product
GEROS	Global Evaluation Reports Oversight System
HDI	Human Development Index
HHQ	Household Questionnaire
HRBA	Human Rights-Based Approach
IDPs	Internally Displaced Persons
IFI	International Financial Institution
INGOs	International Non-Governmental Organizations
IP	Implementing Partner
IR	Inception Report
JMP	Joint Monitoring Programme
KII	Key Informant Interview
M&E	Monitoring & Evaluation
MH	Menstrual Hygiene
MHM	Menstrual Hygiene Management
MICS	Multiple Indicator Cluster Questionnaires
MIS	Monitoring Information System
MEW	Ministry of Energy and Water
MEW	Ministry of Education
MoPH	Ministry of Public Health

MoU	Memorandum of Understanding
MRRD	Ministry of Rural Rehabilitation and Development
MT	Management Team
NEPA	National Environmental Protection Agency
ND-GAIN	Notre Dame Global Adaptation Index
NGO	Non-governmental organization
NTAs	National Technical Assistants
O&M	Operation and Maintenance
ODF	Open Defecation-Free
OECD-DAC	Organisation for Economic Co-operation and Development's Development Assistance Committee
PRRD	Provincial Rural Rehabilitation Directorates
PV	Photovoltaic
PwD	Persons with disabilities
QA	Quality Assurance
RBM	Result-based management
RCCE	Risk Communication and Community Engagement
ROI	Return on Investment
ROSA	South Asia Regional Office
SDG	Sustainable Development Goal
SOP	Standard Operating Procedure
SWS	Solar water systems
TBD	To be determined
ToC	Theory of Change
ToR	Terms of Reference
UN	United Nations
UNCT	United Nations Country Team
UNDAF	United Nations Development Assistance Framework
UNDP	United Nations Development Programme
UNEG	United Nations Evaluation Group
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
UNODC	United Nations Office on Drugs and Crime
USAID	United States Agency for International Development
UWASS	Urban Water Supply and Sewage Corporation
VNR	Voluntary National Review
WASH	Water, Sanitation and Hygiene
WHO	(United Nations) World Health Organization
WSG	Water and Sanitation Group
WSP	Water Safety Plan
WUCs	Water User Committees

## EXECUTIVE SUMMARY

1. **Background and Context:** Afghanistan is one of the most vulnerable countries to climate change, characterized by extreme drought conditions expected to persist into 2026. The collapse of the Government in 2021 and subsequent political isolation have exacerbated a multifaceted humanitarian crisis. Despite significant progress over the past decade, the country remains unlikely to achieve the 2030 Sustainable Development Goal (SDG) target 6.1 for universal access to safely managed drinking water. Groundwater depletion and mass cross-border returns (over 2.5 million in 2025 alone) have further strained limited rural wash infrastructure. The object of this evaluation is the solar water systems (SWS) component of the UNICEF WASH programme. This component was initiated in 2016 and expanded significantly following the political transition, with 71 per cent of systems constructed or rehabilitated between 2022 and 2024. The programme aimed to provide high-quality, sustainable water through the establishment of community-level Water User Committees (WUCs) and implementation following technical standards. The total budget spent for these interventions exceeded USD 60 million in direct implementation costs.

2. **Evaluation purpose, scope, and use:** The purpose of the evaluation is to provide an in-depth review of the functionality of the systems, identifying systemic enablers and barriers. Findings from this summative and formative evaluation are timely to provide comprehensive evidence on the performance, implementation, operation and maintenance (O&M) of water supply investments, serving as a critical tool for incorporating best practices, fostering continuous learning, and ensuring the project's adaptability to better serve both water supply systems (WSS) and beneficiaries. The scope covered all 34 provinces of Afghanistan, with primary data collection concentrated in five provinces,<sup>1</sup> weighted toward older systems to evaluate long-term functionality, covering the implementation period from 2016 to 2024, a timeframe marked by significant political transition and escalating climate-related challenges. This evaluation's primary users are UNICEF ACO, implementing partners (including I/NGOs), and the de facto MRRD, particularly for improving the effectiveness and sustainability of rural water supply interventions. Communities and WUC's, as the ultimate beneficiaries of UNICEF Afghanistan's rural water investments, are also considered primary users. Secondary users include key donors, the WSG, the WASH cluster, other UN Agencies and NGOs in Afghanistan, other de facto ministries and private sector companies, with an aim to generate knowledge and enhance evidence-based decision-making for future water supply programming.

3. **Evaluation Framework and Methodology:** The evaluation utilized the Organisation for Economic Co-operation and Development's (OECD) Development Assistance Committee (DAC) criteria of relevance, coherence, effectiveness, efficiency, sustainability, and impact (contribution), with a primary emphasis on sustainability. It also assessed cross-cutting themes including gender, disability, equity, human rights, "leave no one behind, climate, and environmental and social safeguards. The evaluation also followed a theory-based mixed-methods approach utilizing contribution analysis guided by a retrospective Theory of Change. The evaluation adopted a utilisation-focused and participatory approach to ensure findings were practical, credible, and decision-relevant. Data collection involved:

- Desk Review and analysis of relevant programme documentation, policies, and frameworks.
- Quantitative data: A household questionnaire (HHQ) with 907 beneficiaries (35 per cent women; 24 per cent with disabilities), an O&M questionnaire at 74 sites, and 74 physical observations of SWS infrastructure.
- Qualitative Data: Key Informant Interviews (KIIs) with stakeholders [N=29], In-depth Interviews with women (IDIs) [31], Focus Group Discussions (FGDs) [12], and innovative remote Artificial Intelligence (AI) interviews [45] with extenders and non-governmental organization (NGO) staff to reach a larger sample size.
- Sampling: Stratified purposeful selection of one province from each of the five zones to capture geographic diversity.

### Key Evaluation Findings

4. **Relevance:** The programme was highly relevant at the strategic level, aligning with national water policies and SDG 6.1 aspirations. UNICEF demonstrated strong adaptability, revising implementation strategies in response to the 2021 political transition and the 2024 dissolution of the Community Development Councils (CDCs). Participatory approaches were central, with 93 per cent of O&M personal

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<sup>1</sup> Community-level data collection occurred in Jawzjan, Badghis, Khost, Uruzgan and Laghman.

reporting that meetings were held prior to installation. However, relevance at the implementation level was undermined by inconsistent inclusion of women and marginalized groups due to restrictive de facto policies.

5. **Effectiveness:** The evaluation found that 75 per cent of observed solar-powered water systems continue to provide at least some water services to communities, representing UNICEF Afghanistan's fundamental achievement in expanding rural water access. UNICEF successfully advanced higher service levels, with an increasing focus on providing water at household level, rising from 53 per cent of solar systems completed in 2016 to 92 per cent in 2024. SWSs were the main drinking water source of 87 per cent of users where systems were functional. However, overall effectiveness was hindered by frequent infrastructure breakdowns with over 75 per cent of both O&M personnel and users reporting at least one breakdown and an average downtime for repairs of 55 days. Water availability was further reduced by weather dependency (cloudiness) and seasonal variations. Despite these limitations, user satisfaction remained high (76 per cent "completely satisfied" with the water system), underscoring the significant value of more reliable drinking water access in a highly constrained setting.

6. **Sustainability:** Most systems were sustained over time with 75 per cent of systems providing some water, of which 31 per cent were fully functional. However, functionality rates declined significantly over time. Older systems (completed by 2021) exhibited pronounced degradation: 41 per cent of visited systems completed by 2021 were not functioning at all (not providing any water) compared to 13 per cent of visited installations completed since 2022. Although community ownership is strong, with 86 per cent of users reporting they would "definitely" be able to maintain SWSs and 80 per cent willing to pay higher fees, if necessary, communities lack the financial capacity to source external technical expertise to respond to major component repairs causing system failures. Additionally, declining water availability is another main cause of complete system failures.

7. **Contribution and impact:** SWSs produced substantial positive contributions to family health; 84 per cent of users reported improved family health as a result of SWS installation. Household-level access to water greatly enhanced safety and dignity, with 88 per cent of users feeling safer collecting water. Time savings (reported by 86 per cent) eased domestic burdens, though the ban on girls' secondary education limits the potential educational impacts. Environmentally, UNICEF's shift to prioritize solar systems over diesel-powered pumping has positive implications for greenhouse gas emissions. However, the absence of adequate extraction monitoring introduces the potential for negative climatic impacts, though there is insufficient data to confirm whether these impacts are actually occurring.

8. **Coherence and coordination:** Coordination and coherence was generally strong during the planning and construction phases. UNICEF successfully transitioned National Technical Assistants into extender roles to maintain coordination with the facto authorities with minimal disruption. Coordination with key donors, particularly the now-closed United States Agency for International Development (USAID), was collegial and supported critical programmatic adaptations. However, coordination weakened post-installation, with a third of O&M personnel reporting they never received requested external support.

9. **Efficiency:** Resources were used with reasonable efficiency, particularly through implementation via CDCs, which enabled cost savings compared to NGO partners. Installation below initial projected costs for USAID funding enabled UNICEF to reinvest savings and expand coverage from a target of 525,000 to over 811,000 people. Nevertheless, efficiency was undermined by recurrent delays in Memorandum of Understanding (MoU) approvals, inflation, supply chain disruptions, and the absence of systematic post-construction functionality monitoring.

10. **Cross-cutting criteria:** UNICEF Afghanistan targeted vulnerable groups through household taps that improved women's safety and disability access, and solar water systems reduced risks and time burdens of water collection, supporting equity and LNOB objectives. However, inclusion effectiveness cannot be fully assessed with available evidence, and women's representation and decision-making roles remained limited and uneven, particularly post-2021. While climate relevance is strong given Afghanistan's drought conditions and high solar potential, limited post-installation monitoring, especially of groundwater extraction, constrains conclusions on long-term sustainability and resilience, underscoring the need for stronger safeguards follow-up. Overall, the programme demonstrated partial alignment with Environmental and Social Safeguards (ESS), but more systematic post-construction monitoring is needed to sustain results and accountability over time.

11. **Lessons learned:** Key lessons show that while community ownership and willingness to contribute are strong, they cannot compensate for asset degradation within four to five years of installation, making long-term technical and financial support essential for sustainability. Future programmes should seek a better

balance between a primary focus on installation and ownership to protecting capital assets through rapid repair mechanisms as well as a continuation of regional technical support and enforceable quality controls. The programme demonstrated the importance of operational flexibility, strong partnerships, and adaptive donor relationships in sustaining delivery during political transition. Preserving early community engagement, construction-phase quality assurance, and flexible implementation models, while strengthening post-installation support systems, is critical for future programming.

## Conclusions

12. The evaluation concludes that UNICEF Afghanistan’s solar-powered water systems programme was highly relevant and adaptive, aligning with national rural water objectives, SDG 6.1 aspirations, and UNICEF’s strategic shift toward higher service levels and renewable energy. The programme’s greatest achievement is that 75 per cent of observed systems continue to provide at least some water services, representing a fundamental contribution to expanding rural drinking water access in a highly fragile and climate-affected context. Where systems remained functional, reliance was high, with 87 per cent of users reporting SWSs as their main source of drinking water and 59 per cent relying on them exclusively for drinking, indicating that systems were largely sufficient for core drinking needs even when broader domestic needs were not fully met. However, effectiveness and sustainability were constrained by frequent breakdowns and slow repair cycles, with over 75 per cent of users and O&M personnel reporting at least one system failure and an average repair downtime of 55 days, which reduced service reliability and weakened overall performance over time.

13. In terms of contribution, the evaluation found that functional SWSs delivered substantial benefits for health, safety, and wellbeing. A large majority of users reported improved family health (84 per cent), alongside major time savings (86 per cent) and improved safety and dignity, with 88 per cent feeling safer when accessing water due to reduced exposure to harassment and risks associated with water collection. UNICEF’s prioritization of solarization is likely to reduce greenhouse gas emissions compared to generator-powered systems, while strengthening service continuity in drought-prone settings. The programme also made significant efforts to integrate climate resilience into WASH programming.

14. At the same time, environmental sustainability presents a mixed picture; while solar systems reduce reliance on fossil fuels, the absence of systematic groundwater extraction monitoring raises risks of over-extraction and accelerated groundwater depletion, particularly as deep boreholes enable faster withdrawal than traditional wells. These pressures, combined with declining water availability and limited post-installation monitoring, constrain confidence in long-term resilience and sustainability despite strong achievements in access and service continuity.

## Recommendations

15. The following recommendations are derived from conclusions that flow from the evaluation findings. Presented in priority order based on ET judgment, these recommendations are drawn from triangulating key suggestions provided by respondents during primary data collection, considering operational and contextual challenges in Afghanistan, and corroborating with programme documents. Recommendations were also informed by the preliminary findings’ presentation to the Evaluation Reference Group in December 2025:

- Establish sustainable financing mechanisms for community water systems maintenance and strengthen direct community engagement.
- Enhance the climate resilience of existing infrastructure and more systematically strengthen climate-resilience of future investments.
- Establish and maintain minimum community preparedness standards for sustainable O&M.
- Continue to strengthen women’s meaningful participation through gender-responsive engagement and institutionalize equity, disability, human rights, and Leave No One Behind (LNOB) commitments.
- Sustain UNICEF Afghanistan’s contribution to integrated water resource management efforts in the country.
- Strengthen monitoring, information management, and learning systems.

## 1 INTRODUCTION

1. In line with UNICEF Afghanistan’s Revised Evaluation Policy,<sup>2</sup> the United Nations Children’s Fund (UNICEF) Afghanistan Country Office (ACO) commissioned this evaluation of solar powered water supply systems in rural areas of Afghanistan completed between 2016-2024. The evaluation was conducted between May and November 2025.

2. The purpose of the evaluation is to provide an in-depth review of the functionality of the systems identifying systemic enablers and barriers. Findings from this summative and formative evaluation are timely to provide comprehensive evidence on the performance, implementation, operation and maintenance (O&M) of water supply investments, serving as a critical tool for incorporating best practices, fostering continuous learning, and ensuring UNICEF’s adaptability to better serve both water supply systems (WSS) and beneficiaries.

3. The evaluation was guided by the Terms of Reference (ToR see Annex 1), the evaluation matrix (see Annex 2), and accompanying methodology developed during the evaluation’s inception phase. The evaluation employed a mixed methods approach combining document review with primary qualitative and quantitative data collection. The evaluation adhered to relevant UNICEF and United Nations Evaluation Group (UNEG) norms and standards for evaluation.

## 2 BACKGROUND AND CONTEXT

### 2.1 Country context<sup>3</sup>

4. Afghanistan, located in South Asia, is a landlocked predominantly mountainous country. No recent census has been carried out with population estimates varying by data source. While the majority of the population (73 per cent) live in rural areas,<sup>4</sup> the country is rapidly urbanizing with annual urban migration rate of over three percent driven by limited services in rural areas, frequent natural disasters, economic opportunities and returning migrants. Progress against the Sustainable Development Goals (SDGs) is among the lowest globally; Afghanistan ranks 160 out of 167 countries ranked with progress on most indicators stagnating or improving only marginally.<sup>5</sup> An exception to these trends is in SDG6 where Afghanistan has made notable progress in expanding access to basic drinking water services (SDG 6.1), coverage has increased substantially over the past decade, rising from around half of the population (52 per cent)<sup>6</sup> to 82 per cent using at least basic services by 2024.<sup>7</sup> Despite this progress, the country remains unlikely to achieve the 2030 target of universal access to safely managed drinking water. While the previous government reaffirmed commitment to the 2030 Agenda, current national policies curtailing women’s rights, including bans on girls’ and women’s access to secondary and higher education and the “Law on the Promotion of Virtue and Prevention of Vice” introduced in 2024,<sup>8</sup> directly contravene commitments to achieving SDG 5<sup>9</sup> and SDG 4.<sup>10</sup> These restrictions further increase the risk of uneven service access and disproportionate burdens on women and girls.

5. The country is one of the most vulnerable to climate change with increasing instances of flood and the continuation of extreme drought conditions (which also lower groundwater levels) affecting the entire

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<sup>2</sup> UNICEF Evaluation Office. (2023). Revised Evaluation Policy of UNICEF. Available at: <https://www.unicef.org/executiveboard/documents/item-10-draft-revised-evaluation-policy-unicef-presentation-and-statements-as-2023>.

<sup>3</sup> Further detail on the country context provided in Annex 3. According to the Asia Foundation Model Disability Survey of Afghanistan 2019, approximately 13.9 per cent of the population is estimated to be living with a severe disability.

<sup>4</sup> The World Bank. (2024). Rural Population (% of Total Population)-Afghanistan.” Available at: <https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?locations=AF>.

<sup>5</sup> Sustainable Development Report. (2025). Sustainable Development Report. Available at: <https://dashboards.sdgindex.org/>.

<sup>6</sup> United Nations Department of Economic and Social Affairs. (2024). The Sustainable Development Goals Report 2024. Available at: <https://sdgs.un.org/goals/goal6>.

<sup>7</sup> UNICEF and World Health Organization (WHO). (2025). Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP): SDG Indicator 6.1.1 – At Least Basic Drinking Water Services, Afghanistan. Available at: <https://sdg6data.org/indicator/6.1.1?locations=AF>.

<sup>8</sup> The Islamic Emirate of Afghanistan, Ministry of Justice. (2024). The Law for Propagation of Virtue and Prevention of Vice (Unofficial AAN Translation). Available at: <https://www.afghanistan-analysts.org/en/wp-content/uploads/sites/2/2024/08/Law-on-Virtue-and-Vice-Basic.pdf>.

<sup>9</sup> Sustainable Development Goals. (n.d.). SDG 5: Achieve gender equality and empower all women and girls. Available at: <https://sdgs.un.org/goals/goal5>.

<sup>10</sup> United Nations. (n.d.) SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. Available at: <https://sdgs.un.org/goals/goal4>.

country.<sup>11</sup> The drought is expected to persist into early 2026, with forecasts anticipating below average rainfall and above average temperatures due to anticipated La Niña conditions.<sup>12</sup> The situation has been further aggravated by the COVID-19 pandemic and recurrent disease outbreaks such as measles and acute watery diarrhoea (AWD), deepening an already protracted and multifaceted humanitarian crisis.<sup>13</sup> In addition, mass cross-border returns, with more than 2.52 million Afghans returning from Iran and Pakistan in 2025 alone, coupled with a significant reduction in international aid, including drastic cuts in funding from the United States beginning in January 2025,<sup>14</sup> constitute compounding shocks that have further strained the capacity to respond to rising humanitarian needs, heightening risks to water service continuity, and placing sustained pressure on host communities, basic services and livelihoods.<sup>15,16,17</sup>

6. The collapse of the government in Afghanistan in 2021 marked a significant turning point, with policy decisions by the de facto authorities (DfA), alongside political and economic isolation by international actors, jointly constraining service delivery and limiting scope for mitigation efforts.<sup>18</sup> Prior to the transition, aid accounted for 40 per cent of the country's gross domestic product (GDP) and supported over 50 per cent (approximately US\$6 billion) of the annual national budget, covering around 80 per cent of total public expenditure.<sup>19</sup> The subsequent suspension of most international aid significantly worsened the country's economic situation. While the economy has stabilized somewhat, state capacity for service delivery, especially health and water, sanitation and hygiene (WASH), remains limited.<sup>20</sup>

7. The general security situation and rates of civilian casualties have largely improved since the DfA takeover, with former "white areas" now accessible to de facto government and international actors for the first time in decades. However, as discussed above, restrictions on the participation of women have intensified since the political transition.<sup>21</sup> These measures have significantly limited the ability of women and girls to participate in community level processes, including consultation, planning, and decision-making related to water supply systems.<sup>22,23</sup> Reduced involvement of women in the design, construction, and management of water services has implications for service appropriateness, sustainability, and accountability, and constrains both access to services and the capacity of humanitarian and development actors to deliver gender-responsive WASH programming.

8. **WASH Sector Overview:** The country is facing a widespread and severe water crisis, largely driven by climate change.<sup>24</sup> The persistent water crisis has been compounded by poor management of water resources and an inability of duty bearers to support essential personnel for the maintenance of WASH services, especially following the political transition.<sup>25</sup> Water availability is also threatened by groundwater

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<sup>11</sup> UNICEF and Stockholm International Water Institute (SIWI). (2025). Climate Risk Analysis for the Water, Sanitation and Hygiene Sector in Afghanistan. Available at: <https://knowledge.unicef.org/wash/resource/climate-risk-analysis-water-sanitation-and-hygiene-sector-afghanistan>.

<sup>12</sup> UN OCHA. (2025). 2026 Humanitarian Needs and Response Plan. Available at:

<https://www.unocha.org/publications/report/afghanistan/afghanistan-humanitarian-needs-and-response-plan-2026-summary>.

<sup>13</sup> UN OCHA. (2025). Humanitarian Needs and Response Plan. Available at: <https://humanitarianaction.info/plan/1263/article/health-0>.

<sup>14</sup> UN OCHA. (2025). Afghanistan: Impact of US Funding Suspension on the Humanitarian Response. Available at:

<https://www.unocha.org/publications/report/afghanistan/afghanistan-impact-us-funding-suspension-humanitarian-response-22-apr-2025>.

<sup>15</sup> UN News. (2025). Hundreds of Thousands of Afghans Forced Back into Danger, Says UNHCR. Available at:

<https://news.un.org/en/story/2025/04/1162706>.

<sup>16</sup> UNICEF Afghanistan. (2021). Annual WASH Report-2021. Available at: UNICEF Sharepoint (Internal document)

<sup>17</sup> UN OCHA. (2025). Humanitarian Needs and Response Plan 2026. Available at:

<https://www.unocha.org/publications/report/afghanistan/afghanistan-humanitarian-needs-and-response-plan-2026-summary>

<sup>18</sup> Darcy, James. (2024). Inter-Agency Humanitarian Evaluation of the Response to the Crisis in Afghanistan. Available at:

<https://interagencystandingcommittee.org/sites/default/files/2024-06/Afghanistan%20IAHE%20Executive%20Summary%20April%202024.pdf>.

<sup>19</sup> Runde, Daniel F., Annie Pforzheimer, Thomas Bryja, and Caroline Smutny. (2024). The Future of Assistance for Afghanistan: A Dilemma. Available at: <https://www.csis.org/analysis/future-assistance-afghanistan-dilemma>.

<sup>20</sup> Darcy, James. (2024). Inter-Agency Humanitarian Evaluation of the Response to the Crisis in Afghanistan. Available at:

<https://interagencystandingcommittee.org/sites/default/files/2024-06/Afghanistan%20IAHE%20Executive%20Summary%20April%202024.pdf>.

<sup>21</sup> The Islamic Emirate of Afghanistan, Ministry of Justice. (2024). The Law for Propagation of Virtue and Prevention of Vice (Unofficial AAN Translation). Available at: <https://www.afghanistan-analysts.org/en/wp-content/uploads/sites/2/2024/08/Law-on-Virtue-and-Vice-Basic.pdf>.

<sup>22</sup> UNICEF. (2024). UNICEF Afghanistan Humanitarian Situation Report: 1 January-31 December 2023. Available at:

<https://www.unicef.org/afghanistan/documents/unicef-afghanistan-humanitarian-situation-report-1-january-31-december-2023>.

<sup>23</sup> Human Rights Watch. (2024). Afghanistan: Events of 2024. Available at: <https://www.hrw.org/world-report/2025/country-chapters/afghanistan>.

<sup>24</sup> OCHA. (2023). 2024 Humanitarian Needs and Response Plan. Available at: <https://humanitarianaction.info/plan/1185/article/health>.

<sup>25</sup> UNICEF. (2022). Afghanistan WASH on the Brink. Available at: <https://www.unicef.org/documents/afghanistan-wash-brink>.

depletion related to uneven precipitation, inadequate water resource management, climate change and insufficient storage facilities.<sup>26</sup> In these conditions, WASH constitutes both a crisis its own right and a compounding factor exacerbating existing risks related to health, nutrition, education and rural livelihoods.<sup>27</sup>

9. The country is not on track to achieve SDG targets 6.1 and 6.2 and presents lower than regional averages across all WASH indicators.<sup>28</sup> However, the sector's performance during the evaluation period (2016-2024) continued this positive trajectory, with UNICEF Afghanistan and partners contributing significantly to sustained service expansion. Consistent with global trends, service access and quality are significantly lower in rural areas than in urban areas (Table 1). There are also serious gaps in WASH in Afghan schools and healthcare facilities, nearly 40 per cent of schools do not have basic drinking water, and the majority of healthcare facilities in Afghanistan do not have access to basic WASH facilities.<sup>29</sup>

**Table 1 Afghanistan WASH Indicators, 2022 (as percentages of total)**

Afghanistan	Drinking water			Sanitation			Hygiene		
	National	Rural	Urban	National	Rural	Urban	National	Rural	Urban
Safely managed	30	28	36	-	-	-	-	-	-
Basic service	52	48	63	56	51	70	48	44	59
Limited service	1	1	1	12	8	23	46	49	37
Unimproved	10	14	0	23	29	7	-	-	-
No service	6	8	0	9	12	0	6	6	4

Source: UN Water. Accessed 4 August 2025.<sup>30</sup>

\*The ET notes that not all columns add to 100.

10. Community Development Councils (CDCs) were the primary implementation body for rural water supply projects until 2024. CDCs, operating from 2003 until 2024, contracted implementation, managed community mobilization, established Water User Committees, and contracted mechanics to maintain the systems. CDCs were dissolved through a political directive in May 2024.<sup>31</sup> Rural water supply projects were managed and coordinated by the Ministry of Rural Rehabilitation and Development (MRRD) and their provincial representation (PRRDs), with PRRDs identifying needs and MRRD making and approving designs and providing technical oversight to construction.

11. **WASH policies in Afghanistan:** Prior to the political takeover, UNICEF Afghanistan provided support to key ministries<sup>32</sup> for the development of relevant WASH policies, ensuring programmatic alignment to these policies. The Afghanistan National Rural WASH Policy (2016 – 2020)<sup>33</sup> was designed by the MRRD, Ministry of Public Health (MoPH), and Ministry of Education (MoE) to improve the quality of life of rural communities through providing access to safe drinking water, sanitation services and hygiene promotion. UNICEF Afghanistan supported the first Afghanistan Rural Water Supply O&M strategy which was finalized in 2020 and approved by the Government for national roll-out.<sup>34</sup> The Water and Sanitation Sector Group (WSG) has endorsed the national WASH standards, designs, and guidelines, which are agreed to be

<sup>26</sup> DACAAR and UNICEF Afghanistan. (2023). Groundwater Analysis Report in Eleven Provinces of Afghanistan. Available at: [https://gw4a.acaciadata.com/media/Afghanistan/Groundwater%20resources/Groundwater\\_analysis\\_report\\_in\\_11\\_provinces\\_of\\_Afghanistan.pdf](https://gw4a.acaciadata.com/media/Afghanistan/Groundwater%20resources/Groundwater_analysis_report_in_11_provinces_of_Afghanistan.pdf).

<sup>27</sup> Darcy, James. (2024). Inter-Agency Humanitarian Evaluation of the Response to the Crisis in Afghanistan. Available at: <https://interagencystandingcommittee.org/sites/default/files/2024-06/Afghanistan%20IAHE%20Executive%20Summary%20April%202024.pdf>.

<sup>28</sup> UNICEF and WHO. (2023). Progress on Household Drinking Water, Sanitation and Hygiene 2000–2022: Special Focus on Gender. Available at: <https://www.who.int/publications/m/item/progress-on-household-drinking-water--sanitation-and-hygiene-2000-2022--special-focus-on-gender>

<sup>29</sup> UNICEF. (2022). How an Impending Collapse of the WASH Sector Threatens Afghanistan. Available at: <https://www.unicef.org/media/118356/file/UNICEF%20Afghanistan%20WASH%20on%20the%20Brink%202022.pdf>

<sup>30</sup> See also: UNICEF Afghanistan. (2023). Afghanistan Multiple Indicator Cluster Survey (MICS) 2022–2023. Available at: <https://www.unicef.org/afghanistan/reports/afghanistan-multiple-indicator-cluster-survey-mics-2022-2023>; See also: WHO/UNICEF. (2025). Joint Monitoring Programme for Water Supply, Sanitation and Hygiene, "Afghanistan." Available at: <https://washdata.org/countries/afghanistan>.

<sup>31</sup> Bjelica, Jelena. (2024). The Fate of Village Councils: The Emirate's Effort to Institute Hegemony over Rural Afghanistan. Afghanistan Analysts Network. Available at: <https://www.afghanistan-analysts.org/en/wp-content/uploads/sites/2/2024/07/2024-Village-Councils-FINAL1.pdf>.

<sup>32</sup> Especially the Ministry of Rural Rehabilitation and Development (MRRD), Ministry of Public Health (MoPH) and Ministry of Education (MoE).

<sup>33</sup> MRRD, MoPH, and MoE. (2016). National Rural Water, Sanitation and Hygiene (WASH) Policy 2016-2020. Available at: <https://sar-climate.adpc.net/wp-content/uploads/2022/06/AF-OTH-GD-127.pdf>

<sup>34</sup> UNICEF Afghanistan. (2021). Annual WASH Report-2021. Available at: UNICEF Sharepoint (Internal Document)

implemented by all WASH stakeholders and service providers, and are aligned with the Sphere standards.<sup>35</sup> Following the political transition, UNICEF Afghanistan halted direct support to the de facto government, but continued coordinating with de facto ministries and sector partners to put in place technical standards for the sector.

12. **UNICEF in Afghanistan:** The UNICEF WASH programme in Afghanistan is grounded in a rights-based approach that recognizes access to safe water and sanitation as fundamental human rights. It therefore aims to achieve the outcome of “improved and equitable use of safe drinking water, sanitation, and healthy environments and improved hygiene practices in deprived provinces and vulnerable areas”, which contributes to SDG 6, and supports the realization of children’s rights under the United Nations (UN) Convention on the Rights of the Child (CRC), particularly Articles 24 (Right to health), and 27 (Right to an adequate standard of living).<sup>36</sup> The UNICEF WASH programme is also rooted in the Core Commitment for Children (CCC).<sup>37</sup> The organization emphasizes sustainable solutions. This shift towards the construction/rehabilitation of solar-powered water supply systems, fostering O&M structures at community level through the establishment of water user committees (WUCs) were key efforts that UNICEF expected to support sustainability. These strategies were intended to address Afghanistan’s vulnerability to climate change and aim to transition beyond immediate humanitarian assistance to meet basic needs and ensure long-term sustainability.<sup>38</sup>

## 2.2 Overview of the object of the evaluation

13. The object of this evaluation is the solar-powered community-managed rural drinking water supply systems component within the broader UNICEF Afghanistan WASH programme. This component was implemented beginning in 2016 with implementation ongoing. Installations have been completed in all 34 of Afghanistan’s provinces. UNICEF Afghanistan was an early global adopter of solar-powered piped drinking water systems, funding construction of more such systems during 2016-2021 than any other UNICEF country office worldwide<sup>39</sup> despite Afghanistan’s extremely challenging context. When funding increased significantly after 2021, the capacity, systems, and procedures already established enabled rapid scale-up, with the majority of solar-powered supply systems constructed or rehabilitated between 2022 and 2024 (71 per cent).<sup>40</sup>

14. **Objectives and approach:** The solar-powered water supply system component aimed to provide high-quality water to rural communities through the installation of solar-systems providing water at community level. Implementation aimed to provide household connections where feasible. Alongside physical installations, the programme worked to strengthen the enabling environment for sustainable WASH services, including exploring ways to ensure continued adherence to established policies, procedures and technical standards and guidelines. There has been an increasing focus on community-level sustainability through the formation of community-level WUCs<sup>41</sup> and trained mechanics.<sup>42</sup> Implementation modalities remained largely consistent over the evaluation period (2016-2024), with one significant change following the political transition, that UNICEF began transferring funds for construction directly to CDC accounts rather than through the MRRD. These restrictions also impacted the partnership model which shifted away from (de facto) Government. Prior to 2022, the vast majority of projects completed with the MRRD (97 per cent). Following the political transition, implementation arrangements were divided almost evenly between (I)NGOs (49 per cent) and the CDC (51 per cent).

15. **Intervention logic:** A retrospective Theory of Change (ToC) focusing specifically on the solar-powered community-managed rural water supply systems component of UNICEF Afghanistan’s Rural Water Supply programme was developed by the evaluation team (ET) during the inception phase to guide this evaluation.<sup>43</sup>

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<sup>35</sup> International Federation of Red Cross and Red Crescent Societies (IFRC). (2018). Sphere standards and indicators-WASH. Available at: <https://spherestandards.org/handbook-2018/>.

<sup>36</sup> United Nations. (1989). Convention on the Rights of the Child. Available at: <https://www.ohchr.org/en/instruments-mechanisms/instruments/convention-rights-child>.

<sup>37</sup> UNICEF. (2022). Core Commitments for Children. Available at: <https://www.unicef.org/emergencies/core-commitments-children>.

<sup>38</sup> Ibid.

<sup>39</sup> Based on UNICEF stakeholder feedback.

<sup>40</sup> UNICEF Afghanistan. (n.d.). Community Solar Systems (Construction and Rehabilitation) Report for 2016–2024. Available at: UNICEF Sharepoint (Internal Document).

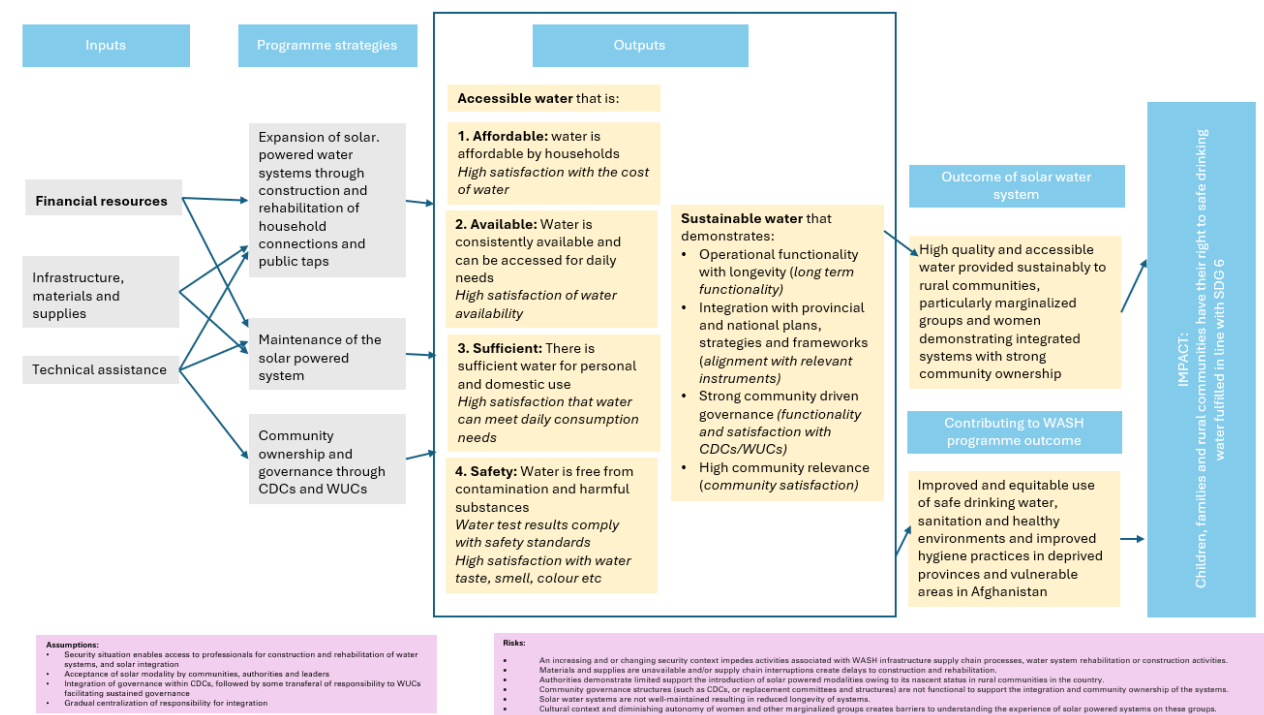
<sup>41</sup> The terminology for these community-level governance structure varies. For the sake of consistency, this report will use WUC.

<sup>42</sup> UNICEF Afghanistan. (2021). Annual WASH Report-2021. Available at: UNICEF Sharepoint (Internal Document).

<sup>43</sup> The ToC was reviewed by UNICEF in the inception phase.

A graphic representation of the ToC is provided in Figure 1 below and described further in Annex 4. A short narrative explanation of the intervention logic is described following the graphic.

Figure 1 Retrospective ToC



Source: Developed by the ET

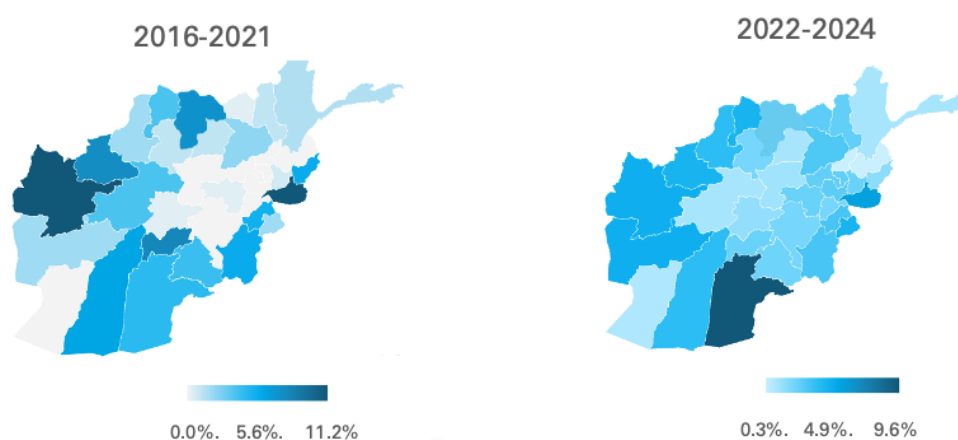
16. The theory of change posits that: IF financial resources, supplies and technical assistance for solar powered water supply to rural Afghanistan are expanded through construction and rehabilitation of household connections and taps, maintained, and owned/governed through community structures, THEN accessible water, that is affordable, available, sufficient, safe and sustainable, with strong community ownership of systems, will be provided. These investments are expected to contribute to improved, equitable use of safe drinking water, sanitation and hygiene practices in deprived provinces among vulnerable groups in Afghanistan whereby children, families and rural communities have their right fulfilled to safe drinking water (in line with SDG 6). This ToC reflected a pragmatic adaptation to the Afghan context. Recognizing the absence of government authority responsible for O&M or ensuring sustainable service delivery, the programme design prioritized reliable, robust systems using good quality materials and minimal 'moving' parts that communities were expected to largely manage independently with minimal technical support. The choice for piped systems with household connections was based on: (1) maximizing health and hygiene benefits through increased household-level water availability, and (2) providing a high level of service that would incentivize households to sustain system operations. UNICEF Afghanistan and MRRD acknowledged from inception that water availability would fluctuate during prolonged cloudy periods and dry spells, and that affordability could be challenging. The design trusted community management and resilience to address constraints to affordability through subsidized access for the poor and community-led resource mobilization. The design incorporated water meters on piped systems to enable consumption-based pricing and support sustainable water use management with nearly all household connections (representing an increasing proportion of overall installations) reported to include the installation of water meters.

17. **Budget:** The component has been supported by contributions from a range of donor partners and UNICEF Afghanistan's own resources which support WSSs more generally rather than specific earmarking for solar provision. According to the beneficiary database provided by UNICEF Afghanistan, the total budget for direct implementation costs of the solar-powered WSS was over 60 million USD, excluding UNICEF Afghanistan support costs.

18. **Geographic coverage:** The distribution of solar-powered water systems reflected both programmatic continuity and expanded implementation scale. Two-thirds of systems were constructed during 2021-2024, resulting in broader provincial coverage due to increased construction volume and improved access rather than a shift in geographic targeting strategy. The political transition improved access to previously insecure

areas, such as Kandahar, where arid conditions and deep aquifers made solar-powered systems particularly appropriate.<sup>44</sup> Figure 2 shows a graphic representation of the percent of total solar water systems (SWS) completed by province for the specified time period.

Figure 2 Geographic spread of implementation



Source: UNICEF Afghanistan Community Solar Systems (Construction and Rehabilitation) Report for 2016–2024

19. **Rightsholders (beneficiaries):** The solar water supply component primarily targets rural communities. Focus areas and target populations have varied according to donor and have included malnourished children, disaster affected communities, as well as those affected by disease outbreaks. The broader programme also targets institutions, such as public schools and healthcare facilities, benefiting students, teachers, patients, and healthcare workers within their catchment areas. Over 2.3 million people have been reached through the interventions, representing over 330,000 households. Table 2 provides a detailed breakdown of households and beneficiaries across the country by type of SWS intervention. UNICEF Afghanistan collects disaggregated information as feasible in the communities, but this information was not available to the ET. As confirmed with UNICEF Afghanistan stakeholders, an estimate of gender disaggregation is used when collection of disaggregated information is not feasible. Disability disaggregation is not consistently available.

Table 2 Solar-powered WSS beneficiaries (2016-2024)

Activities	Total systems	HHs/Families	Beneficiaries
		No.	No.
<b>Construction</b>			
Household connection	582	194,484	1,356,167
Public taps	174	41,737	291,840
<b>Rehabilitation</b>			
Household connection	94	70,650	491,850
Public taps	45	31,937	219,808
<b>Total</b>	<b>895</b>	<b>338,808</b>	<b>2,359,665</b>

Source: UNICEF Afghanistan Community Solar Systems (Construction and Rehabilitation) Report for 2016–2024

20. **Other stakeholders:** The SWS design, monitoring and implementation involved a range of actors from UNICEF Afghanistan, the (de facto) government, non-governmental organizations (NGOs), the private sector and various donors. Key stakeholders which are directly or indirectly involved in intervention delivery are summarised in Table 3 below.

Table 3 Summarised stakeholder analysis

Stakeholder category	Description
(de facto) Government	Prior to 2021, UNICEF Afghanistan provided direct support to build the capacity of national and local government-MRRD and PRRDs and chaired the WSG alongside MRRD. The WSG was an

<sup>44</sup> UNICEF Afghanistan. (2023). Water Supply, Sanitation and Hygiene Annual Report 2022. Available at: UNICEF Sharepoint (Internal Document)

	essential forum to define common operating procedures, technical standards, and guidelines. UNICEF Afghanistan’s rural water supply component of the UNICEF Afghanistan-supported WASH programme was exclusively implemented through the Rural Water Supply and Sanitation department (Ru-WatSIP) of the MRRD. <sup>45</sup> This ensured that the delivery of SWs was aligned with national policies. Following the political transition, and the related restrictions on financial transactions supporting the DfA, UNICEF Afghanistan continued coordinating with the DfA but halted direct support, hiring extender staff to support key WASH functions for planning, design, technical support, and monitoring purposes. <sup>46</sup>
NGOs/private sector	Following the DfA takeover, partnerships shifted from a near exclusive work with the MRRD to a greater focus on service provision through NGOs and the private sector. During 2016-May 2024, CDCs exclusively contracted local private sector entities for construction of solar-powered systems. According to the UNICEF stakeholders, this model engaged numerous local contractors across communities, distributing project funds widely, building local capacity, and strengthening local markets through local sourcing of materials. MRRD/PRRD provided primarily technical support. Following CDC dissolution in May 2024, UNICEF shifted to direct contracting with private sector companies. Given programme scale and administrative requirements, this necessitated bundling contracts with fewer, larger companies, a departure from the CDC model’s wider geographic and economic distribution of benefits.
UNICEF Afghanistan	UNICEF Afghanistan plays a crucial role in technical advice, project management, quality assurance, operational support, monitoring, and reporting. UNICEF Afghanistan is also a broader actor in the WASH sector in Afghanistan, leading the WASH cluster and facilitating coordination and service delivery more broadly.
CDCs	Prior to the political transition, contracts were signed between the CDCs and the MRRD. UNICEF Afghanistan paused interactions with CDCs following the political transition with activities with CDCs resuming by May 2022. A further directive in May 2024 to dissolve the CDCs prompted partners to liquidate CDC-led projects. Following this directive, UNICEF Afghanistan continued to work with communities to enhance capacity for continued operation of systems and their maintenance as well as to ensure sustainability. <sup>47</sup>
WUC	Initially given limited attention by the Ru-WatSIP programme and the PRRD, UNICEF Afghanistan and Ru-WatSIP paid increasing attention to strengthening community-level governance from 2017. <sup>48</sup> From 2017-2021, UNICEF Afghanistan reported the establishment of community-level WUCs in all communities where metered systems were installed. <sup>49</sup> From 2022 onwards, these systems were reported for all WSSs established. Establishment of a WUC included a minimum of two people from each community trained on O&M to support system sustainability. <sup>50</sup>
Mechanic	In each community, a mechanic was expected to be trained as the lead person to provide O&M as part of the WUC.
Donors	While many donors support the broader UNICEF Afghanistan WASH programme, United States Agency for International Development (USAID) has been the primary donor specifically linked to the solar powered rural water supply component specifically (funding over 30% of systems based on consolidated implementation figures provided by UNICEF). <sup>51</sup> UNICEF Afghanistan’s own resources (Regular Resources and Global WASH Thematic Funding) also represent a substantial part of the funding base for the broader rural water supply programme based on reviewed annual reports. <sup>52</sup>

21. **Gender, disability, equity, and inclusion:** UNICEF Afghanistan’s broader WASH programme in Afghanistan committed to gender-responsive approaches including strengthening the gender mainstreaming capacity of (de facto) authorities.<sup>53</sup> The intent to include women in decisions about water system construction and maintenance strategies was noted in all reviewed proposals. Broader issues of equity and inclusion were expected to be addressed through the WASH programme’s increased focus on targeting the hardest to

<sup>45</sup> Prior to the transition.

<sup>46</sup> UNICEF Afghanistan. (2021). Annual WASH Report-2021. 2021. Available at: UNICEF Sharepoint (Internal Document)

<sup>47</sup> UNICEF Afghanistan. (2025). Afghanistan WASH Thematic Report 2024. Available at: UNICEF Sharepoint (Internal Document)

<sup>48</sup> UNICEF Afghanistan (2016). Annual WASH Report to Donors-2016. Available at: UNICEF Sharepoint (Internal Document)

<sup>49</sup> UNICEF Afghanistan. (n.d.). Annual WASH Report to Donors 2017, 2018, 2019, 2020, 2021. Available at: UNICEF Sharepoint (Internal Document)

<sup>50</sup> UNICEF Afghanistan. (2023). Afghanistan WASH Thematic Report: January-December 2022. Available at: UNICEF Sharepoint (Internal Document)

<sup>51</sup> The ET cannot determine the exact number of systems funded through USAID as the ET did not have access to all donor codes. This figure refers to grant codes attributed to USAID as the primary funding grant.

<sup>52</sup> The ET did not have access to all donor codes to determine the total amount provided for implementation or the proportion of systems funded from these sources

<sup>53</sup> UNICEF Afghanistan. (n.d.). UNICEF Afghanistan Water, Sanitation and Hygiene Programme Strategy Note 2017-2019. Available at: UNICEF Sharepoint (Internal Document)

reach, vulnerable, and marginalized populations. Addressing access barriers to persons with disabilities was mentioned in the 2022-2025 WASH Programme Strategy Note (PSN).<sup>54</sup>

### 3 EVALUATION PURPOSE, OBJECTIVES AND SCOPE

#### 3.1 Evaluation Purpose

22. The evaluation purpose, as refined during the inception phase, has a primary focus on assessing the sustainability of UNICEF Afghanistan solar-powered piped water systems in rural Afghanistan, as well as assessing the relevance, effectiveness, efficiency, coherence, coordination, impact and cross-cutting themes, to the extent possible. The evaluation provides an in-depth review of system functionality, identifying systemic enablers and barriers through assessing the proportion of systems found to be functional combined with significant emphasis on understanding the main causes affecting functionality.

23. The evaluation fulfils both summative (retrospective) and formative (forward-looking) purposes. The summative focus examines the proportion of systems found to be functional, while the formative analysis informs lessons learned and recommendations on how to improve sustained functionality going forward. As such, the evaluation serves as a critical tool for incorporating best practices, fostering continuous learning, and ensuring the solar-powered water supply systems' adaptability to better serve beneficiaries.

24. The timing of the evaluation is appropriate given that the original timeframe for the component has ended. Findings and recommendations will generate comprehensive evidence for improvement and scale-up of future solar-powered water supply interventions.

#### 3.2 Evaluation objectives

25. The evaluation has eight specific objectives summarised below:<sup>55</sup>

- **To assess the project's long-term sustainability and climate resilience (sustainability)**
- Assess the quality of the approach, design and implementation (relevance and effectiveness)
- Identify contribution and achievement of results (impact, to the extent possible)
- Build understanding of implementation through the community structures (effectiveness, efficiency, relevance, sustainability, coherence)
- Explore the coherence and coordination among key stakeholders before and after the political transition (coherence and coordination)
- Assess the efficiency of management, governance, and resourcing arrangements (efficiency)
- To identify lessons learned from Afghanistan that can be applied in similar contexts (lessons)
- To examine the extent to which cross-cutting themes of gender, equity, human rights, leave no one behind (LNOB), climate, disability and environmental and social safeguards (ESS) have been integrated into the solar powered water supply systems programme in rural areas (cross-cutting areas)

#### 3.3 Evaluation scope

26. The evaluation scope was revised during the inception phase based on confirmation with the Evaluation Reference Group (ERG). The primary improvements included streamlining evaluation questions (EQs) to reduce duplication and enhance clarity, adding the quantitative O&M questionnaire to bolster sustainability analysis, and removing less-prioritized elements from the evaluation scope to ensure that evaluation resources were sufficient to meet the revised evaluation objectives (return on investment, assessing the carbon footprint, cost benefit analysis and comparison with similar contexts were removed from the scope). Further detail on revisions to scope are included in Annex 5.

27. The overall evaluation scope remains unchanged from the ToR as presented in Table 4.

**Table 4 Evaluation scope**

Scope	Description
<b>Geographic</b>	<b>National:</b> all provinces and districts across the five regions where solar-powered water system interventions were implemented. Primary data collection covers one province from each of the five regions across the country. Villages for primary quantitative data collection were randomly sampled

<sup>54</sup> UNICEF Afghanistan. (n.d.). UNICEF Afghanistan Country Office Programme Strategy Note 2024/2025. Available at: UNICEF Sharepoint (Internal Document)

<sup>55</sup> For further details please refer to Annex 5.

	and may include some urban/peri-urban areas. Qualitative data collection will focus more exclusively rural villages only given the focus of rural areas in the component logic.
<b>Temporal</b>	<b>2016 to 2024.</b> Given the focus on sustainability, the household sampling strategy has been stratified to achieve a greater weighting on older systems
<b>Thematic</b>	The evaluation focused on water access via solar-powered water supply systems at the <b>household level</b> . Data collection explored broader impacts on other sectors, specifically health and the environment, to capture both intended and unintended outcomes. Cross-cutting themes (gender, equity, human rights, LNOB, climate, disability and ESS) are mainstreamed within the evaluation criteria with findings succinctly summarized under a dedicated section.

### 3.4 Evaluation stakeholders (evaluation users and potential uses)<sup>56</sup>

28. This evaluation’s primary users are UNICEF ACO, implementing partners (including (I)NGOs), and the de facto MRRD, particularly for improving the effectiveness and sustainability of rural water supply interventions. Communities and WUC’s, as the ultimate beneficiaries of UNICEF Afghanistan’s rural water investments, are also considered primary users. Secondary users include key donors, the WSG, the WASH cluster, other UN Agencies and NGOs in Afghanistan, other de facto ministries and private sector companies, with an aim to generate knowledge and enhance evidence-based decision-making for future water supply programming. A comprehensive mapping of how different user groups will utilize evaluation findings is provided in Annex 5.

## 4 EVALUATION FRAMEWORK, DESIGN AND METHODOLOGY

29. The following narrative provides an overview of the evaluation methodology; further details are provided in Annex 6.

### 4.1 Evaluation framework

30. The evaluation utilised the six evaluation criteria as defined by the Organisation for Economic Co-operation and Development's (OECD) Development Assistance Committee (DAC): relevance, coherence, effectiveness, efficiency, impact (contribution), and with an emphasis on sustainability. The evaluation also assessed non-OECD-DAC criteria of the integration of cross-cutting themes (gender, equity, human rights, LNOB, climate, disability and ESS consideration).

31. The ET prepared an evaluation matrix (EM) based on the revised EQs included in the ToR and informed by discussions with the UNICEF Afghanistan during inception stage. The final EM is presented in Annex 2. Key questions are subdivided into sub-questions, accompanied by relevant indicators (or areas of inquiries), the data sources, and data collection methods utilised to assess each indicator. The key evaluation questions and relation to evaluation objectives are listed under each evaluation criteria are listed in Table 5 below.

**Table 5 Evaluation questions and criteria**

RELEVANCE	Objectives
<b>Evaluation Question 1: To what extent is the programme design, model, and approach to improve water supply systems in Afghanistan relevant and appropriate to the needs of beneficiaries?</b>	
EQ 1.1 To what extent and how were local stakeholders, including women, marginalized groups and local community members, involved at each stage of the project?	2
EQ 1.2 To what extent did the project remain relevant to changing needs and priorities of beneficiaries considering <ul style="list-style-type: none"> <li>- Changes in gender dynamics/restrictions on women’s movement</li> <li>- Changes in community and household dynamics and shifting levels of social cohesion</li> <li>- Changes in community-based WASH governance structures</li> </ul>	2, 4
EFFECTIVENESS	
<b>Evaluation Question 2: To what extent were the stated objectives and set targets of the programme achieved, and how effectively have the programme interventions facilitated access to WASH services for the affected population?</b>	
EQ 2.1: How effective are the systems for improving access to functional, accessible, available, affordable, sufficient and safe water?	2
EQ 2.2: To what extent do communities have the financial, material and technical support to maintain the system (including the role of mechanics, local supply chains and tariff systems)?	2
EQ 2.3: To what extent was the quality of design and execution sufficient to enable system operation? (including climate resilience/durability of systems)	2

<sup>56</sup> For further details please refer to Annex 5.

EQ 2.4: What are any other key challenges/enablers emerging from the data collection affecting the operation of water systems? (e.g. water quality issues, funding, capacity of government/de facto authorities/contractors, water use for non-drinking purposes, etc.)	2
<b>SUSTAINABILITY</b>	
<b>Evaluation question 3: To what extent are solar-powered and piped water supply systems in Afghanistan sustainable?</b>	
EQ3.1 To what extent do solar powered and piped water supply systems providing/expected to provide sustained access?	1
EQ3.2 How resilient are these solar-powered systems to climate-related challenges such as droughts, floods, and extreme weather conditions?	1, 8
EQ 3.3: What was the process of handing over the solar-powered water projects to CDCs and the communities, and how did this transition take place?	4
EQ 3.4: To what extent does community management and governance functionality, modality of operation and transparency support or challenge system operation and sustainability? (findings disaggregated by type of function i.e. CDC, WUC as relevant, including the role of women) <sup>57</sup>	4
<b>CONTRIBUTION/IMPACT</b>	
<b>Evaluation Question 4: What are the intended and unintended contributions of solar-powered and piped water supply systems on children, women, communities, and the environment in Afghanistan, particularly regarding health, well-being, climate change, and social outcomes?</b>	
EQ 4.1: Have solar-powered water supply systems contributed (intended or unintended) to the health and well-being of children, women, and communities?	3, 8
EQ4.2: Have there been any other impacts (intended or unintended) on children, women and communities (including climate change and social outcomes)?	3, 8
<b>COHERENCE AND COORDINATION</b>	
<b>Evaluation Question 5: How coherent and well-coordinated have the working relationships been among key stakeholders, such as the O&amp;M committee, CDCs (until 2024), communities, mechanics, and other relevant actors, during the implementation of the solar-powered water supply systems in rural Afghanistan before and after the political transition?</b>	
EQ5.1: How effectively did the key stakeholders (the O&M committee, CDCs, communities, and mechanics, as well as UNICEF Afghanistan, implementing partners, donors, line ministries, and relevant clusters) collaborate and coordinate throughout the project?	4, 5
<b>EFFICIENCY (Management, governance and resourcing arrangements)</b>	
<b>Evaluation Question 6: How efficiently were the programme's human and financial resources used to enable optimal attainment of the expected outcomes and to what extent were management and monitoring and evaluation (M&amp;E) systems appropriate to enable achievement of intended results in an economic and timely manner?</b>	
EQ 6.1 To what extent were resources (financial, human, and technical) used efficiently in the design and implementation of the water supply systems?	6
EQ6.2 How effectively does the management and M&E systems of the project ensure quality and efficiency in achieving the expected results, considering factors such as resource management (human and financial), risk assessment, and mitigation measures?	6
<b>LESSONS LEARNED</b>	
<b>Evaluation Question 7: What lessons can be learned from the implementation of solar-powered and piped water supply systems in Afghanistan, including successful practices that should be sustained and elements that need adaptation?</b>	
EQ 7.1 What are ways to improve engagement, utilization, and strengthening of ownership and accountability as well as integration and national ownership?	7
EQ 7.2 What are lessons learned from UNICEF Afghanistan's management that could be used for continuation?	7
<b>CROSS-CUTTING CRITERIA</b>	
<b>Evaluation Question 8: To what extent have the solar-powered water supply systems in rural Afghanistan integrated gender, disability equity, human rights, the commitments to 'leave no one behind', climate, and environment and social safeguards?</b>	
EQ 8.1: To what extent and how effectively has the programme integrated principles of gender, disability, equity, human rights and LNOB commitments?	8
EQ 8.2: To what extent and how effectively has the programme integrated climate and principles of environment and social safeguards?	8

<sup>57</sup> Given questions about whether there is actual or only terminology differences between water management mechanisms (e.g., WUC and CDC), the focus will be on water governance functionality with exploration of the specific mechanisms adapted based on community-level findings.

## 4.2 Evaluation design and approach

32. The evaluation methodology follows a **theory-based, mixed methods** approach utilising contribution analysis. Contribution analysis centres on the reconstructed ToC (see Figure 1) which serves as the central framework for the evaluation to explain how the intervention is expected to produce the expected results. Through contribution analysis, the team explored and analysed the inputs, resources, processes, activities and implementation modalities carried out by component stakeholders and their various contributions in achieving (or not) the intended component results.<sup>58</sup>

33. A **participatory, utilization-focused** approach ensured that key stakeholders were closely engaged to enable meaningful participation and ownership, ensuring all deliverables and processes make relevant contributions to organisational learning and decision-making. Special attention was given to ensuring the accessibility of data collection tools.

34. Gender considerations are included within cross-cutting themes as a standalone criterion and mainstreamed into the evaluation criteria through the inclusion of sub-questions and indicators. The evaluation team referred to the UNICEF guidance on integrating gender in evaluations<sup>59</sup> and the UNEG guidance on integrating gender and human rights in evaluations<sup>60</sup> to ensure appropriate considerations of these elements. LNOB considerations were similarly mainstreamed throughout the evaluation process, informing the design of data collection tools, sampling strategies, and analysis frameworks to ensure the voices and experiences of marginalized groups were captured. Disability considerations have similarly been mainstreamed, with special attention given to ensuring the accessibility of data collection tools. The UNICEF Guidance for designing and implementing sector-wide sustainability checks (SWSC) in WASH,<sup>61</sup> and the previous guidance developed in 2017, formed an integral framework for defining the indicators that are relevant to assessing the effectiveness of solar water supply interventions.

## 4.3 Evaluation methods and data collection tools

35. A set of data collection tools was developed to address the lines of inquiry drawing on multiple approaches (Annex 6). The link between the evaluation methods and the OECD-DAC criteria is described in Table 6 below. Both in-person and remote methods were utilised for data collection with national and provincial-level stakeholders based on stakeholder availability. Data collection with community-level stakeholders was conducted in person. One innovative approach to reach a broader cohort of stakeholders involved using remote Artificial Intelligence (AI) interviews with UNICEF Afghanistan extenders and (I)NGO staff, which enabled the ET to gather key themes and insights from a significantly larger sample size than would be feasible through traditional methods alone.<sup>62</sup> Qualitative data collection was also used to develop examples exploring community members' experiences.

**Table 6 Link between data collection and OECD DAC criteria**

Tool		Stakeholders	Relevance	Effectiveness	Sustainability	Contribution / impact	Coherence/ Coordination	Efficiency	Lessons learned	Cross-cutting criteria
Quant.	Desk Review	n/a								
	O&M Questionnaire	O&M personnel								
	Physical observation	n/a								
	Household questionnaire (HHQ)	Men and women beneficiaries								

<sup>58</sup> Further details on the use of contribution analysis in this evaluation are provided in Annex 6.

<sup>59</sup> UNICEF. (2019). UNICEF Guidance on Gender Integration in Evaluation. Available at: <https://www.unicef.org/evaluation/documents/unicef-guidance-gender-integration-evaluation>.

<sup>60</sup> UNEG. (2024). Integrating Human Rights and Gender Equality in Evaluations." New York: United Nations Evaluation Group. Available at: <http://www.uneval.org/document/detail/3963>.

<sup>61</sup> UNICEF and UNDP-SIWI Water Governance Facility. (2021). Sustainability Check Tool: Guidance for designing and implementing Sector-Wide Sustainability Checks in WASH. Available at: <https://knowledge.unicef.org/CEED/resource/unicef-sector-wide-sustainability-check-tool-guidance-designing-and-implementing-sector>.

<sup>62</sup> An automated AI-powered interview platform was employed allowing for those interviewees to provide responses on their own schedule. This method also helped the ET reach geographically dispersed participants efficiently. Please refer to the inception report for more details.

Qualitative	AI Interview	Extenders, (I)NGO staff	Dark grey	Dark grey	Dark grey	Light grey	Dark grey	Dark grey	Dark grey	Light grey
	KII/group interviews	DfA, UNICEF, extenders	Dark grey	Dark grey	Light grey	Dark grey	Dark grey	Dark grey	Dark grey	Light grey
		Donors and cluster	Light grey	White	White	Light grey	Dark grey	White	White	Light grey
		Mechanics	Light grey	Dark grey	Dark grey	White	Dark grey	Dark grey	Dark grey	Light grey
	IDIs	Women beneficiaries	Dark grey	Dark grey	Dark grey	Light grey	Dark grey	Dark grey	Dark grey	Dark grey
	FGDs	Men beneficiaries	Dark grey	Dark grey	Dark grey	Light grey	Dark grey	Dark grey	Dark grey	Dark grey
CDC/WUC members		Light grey	Light grey	Dark grey	White	Dark grey	Dark grey	Dark grey	Light grey	

Key: Dark grey: primary source of information; light grey: secondary source of information; white: minimal/no information

36. There were some changes from the planned methods presented in the inception report; implications of these changes are discussed under 'limitations and mitigation measures' (Section 4.8).

#### 4.4 Sampling

37. Selection criteria for primary data collection activities aimed to capture the diversity of stakeholders through the inclusion of data collection activities collecting information from stakeholders at local, provincial, zonal, national, regional and international level. Given the importance of community-level stakeholders in determining the functionality of water systems, and in line with UNICEF Afghanistan's guidance on WASH Sustainability Checks, the majority of data collection activities took place with community-level stakeholders.

38. For both qualitative and quantitative data, provincial selection was purposeful to include one province from each zone<sup>63</sup> while avoiding repeated data collection across multiple evidence-gathering initiatives in addition to other criteria. The final selection of villages was stratified to achieve a higher proportion of interventions completed by 2021, in line with the evaluation's focus on sustainability. Further details on sampling are provided in Annex 6.

39. The individual selection for quantitative and qualitative data collection followed different sampling methods. Households for inclusion in the HHQ were selected through a random walk protocol. For the O&M questionnaire, respondent selection was purposeful based on selection of 1-3 persons in the community identified as trained in/responsible for operation and maintenance of the water supply system.

40. For individual selection for qualitative data collection, the ET employed purposive sampling for data collection with a clear focus on the following key aspects:

- To include all relevant categories of stakeholders at all levels to seek their input and suggestions to address the EQs.
- To include a diverse range of locations and communities for data collection considering the accessibility, feasibility, avoidance of any security risk, and convenience.
- Reaching community members who had different experiences with the rural water system functionality.

41. Data collection details are provided in Table 7 below. Overall, the majority of primary data collection stakeholders were from the community (65 per cent). Further details on sampling are provided in Annex 6.

**Table 7 Data collection details**

Tool	Stakeholders	Coverage	Sampling <sup>64</sup>	Change from Inception Report (IR)
AI Interview	Extenders, Implementing Partners (IPs), UNICEF Afghanistan staff	National	45 (7%w)	AI interview extended to enable additional participation, surpassing IR target.
KII	UNICEF Afghanistan staff	International, regional, national	15 (33%w)	KIIs extended to enable additional participation, despite some stakeholders not being available for interview.
KII	De-facto PRRD	Jawzjan, Badghis, Khost,	4 (0%w)	No PRRD in Badghis or MRRD available.
	SWS mechanics	Uruzgan, Laghman	10 (0%w)	No change from IR.
IDIs	Women beneficiaries		31 (100%w)	No women included in Uruzgan due to DfA restrictions.

<sup>63</sup> North: Jawzjan, West: Badghis, Central: Khost, South: Uruzgan and East: Laghman

<sup>64</sup> Number in parenthesis indicates the % women included in the sample.

<b>FGDs</b>	Men beneficiaries and local SWS governance actors		12 (0%w)	Additional FGDs conducted to bolster evidence base.
<b>HHQ</b>	Men and women beneficiaries <sup>65,66</sup>		907 (35%; 24% with disability <sup>67</sup> )	A slight drop from the original sample planned (1068) due to challenges with replacement villages in the sampling frame and many originally selected villages lacking installed solar systems.
<b>O&amp;M Questionnaire</b>	Persons responsible for SWS O&M		74 (0%)	A slight difference from the original sample (89) due to fewer villages reached than anticipated and limited availability during data collection timeframe.
<b>Physical observation</b>	n/a: SWS infrastructure		74 (n/a)	

#### 4.5 Data analysis

42. **Quantitative Data Analysis:** The quantitative data collected through the household questionnaire underwent a thorough analysis using statistical software, such as R and SPSS. Analysis plans guided the overall analysis, including descriptive statistics (averages, means, frequencies), and cross tabulations for cross-cutting considerations were conducted.

43. **Qualitative Data Analysis:** The evaluation team undertook a systematic content and thematic analysis of the field notes and recordings collected during the KIIs and FGDs. Where consent was obtained, Claude AI (Anthropic, 2025) was used to assist with qualitative data analysis, including thematic identification and pattern synthesis. All outputs were critically reviewed, verified, and interpreted by the evaluation team. Only de-identified or summarized text segments were processed, and no personally identifiable data were shared. All AI use adhered to the ethical principles of Sensitivity, Transparency, Responsibility, Ethics, Scepticism, and Security.<sup>68</sup> The evaluation team also referred to UNICEF’s own guidance on AI.<sup>69</sup> Where consent was not obtained, the evaluation team relied on manual extraction to an Excel-based matrix to build findings. Key findings were triangulated with secondary sources to validate judgments and conclusions. This comprehensive analysis ensures a robust evaluation of different programmatic aspects and perspectives, enhancing the validity and reliability of the conclusions drawn from the available data.

44. **Integration of cross-cutting issues:** The evaluation systematically integrated cross-cutting themes of gender (including women’s participation), disability, equity, human rights, LNOB principles, climate, and ESS. The design, methodology, tools, and data collection processes were fully aligned with the UN System-Wide Action Plan (UN SWAP) 2.0 accountability framework for mainstreaming Gender Equality and the Empowerment of Women (GEEW), UNICEF guidance on integrating gender in evaluations<sup>70</sup>, and the UNEG guidance on integrating gender and human rights in evaluations.<sup>71</sup> The ET incorporated all relevant indicators and dimensions across all evaluation phases, including specific measure to identify and prioritize the needs of marginalized and vulnerable populations in line with LNOB commitments. Equity considerations shaped sampling strategies to ensure representation of hard-to-reach communities, while human rights principles underpinned the evaluation’s analytical framework and ethical protocols. The evaluation considered how the component impacted different genders, ages, ethnicities and those living with disabilities to the extent feasible. Findings on cross-cutting integration are summarized under a dedicated criterion to ensure visibility.

45. **Validation and triangulation:** Findings were triangulated to increase the robustness of conclusions and recommendations. The evaluation underwent a quality review with comments from the evaluation management team, including evaluation manager and technical staff from the WASH section. A meeting with the ERG, including internal and external stakeholders, was executed to validate findings and recommendations.

<sup>65</sup> Breakdown of overall HHQ participants was as follows: Uruzgan: 30%, Badghis: 18%, Jawzjan: 10%, Khost: 10%, Laghman: 32%.

<sup>66</sup> The HHQ tool included a question asking if there were any household members with a disability.

<sup>67</sup> Please note that 24% of surveyed households reported at least one member with a disability.

<sup>68</sup> Adu, Philip. (2025). Ethical AI in Research: Avoid These Mistakes with the STRESS Method. Available at: <https://www.youtube.com/watch?v=RuuOCS92Vbg>.

<sup>69</sup> UNICEF Innocenti. (2025). Guidance on AI and Children 3.0. Florence. Available at : <https://www.unicef.org/innocenti/reports/policy-guidance-ai-children>.

<sup>70</sup> UNICEF. (2019). UNICEF Guidance on Gender Integration in Evaluation. Available at: <https://www.unicef.org/evaluation/documents/unicef-guidance-gender-integration-evaluation>.

<sup>71</sup> UNEG. (2014). Integrating Human Rights and Gender Equality in Evaluations. Available at: [https://www.unevaluation.org/uneg\\_publications/integrating-human-rights-and-gender-equality-evaluations](https://www.unevaluation.org/uneg_publications/integrating-human-rights-and-gender-equality-evaluations).

## 4.6 Quality assurance and evaluation management

46. The evaluation was managed internally by an Evaluation Manager (Evaluation and Research Specialist) at UNICEF ACO. An Evaluation Management Team comprising the Evaluation Manager and representatives from the WASH section and an ERG comprised of internal and external stakeholders supported the process and reviewed all deliverables. The team leader held overall responsibility for high quality deliverables, including supervising the data collection services provided by the national partner.

47. UNICEF Afghanistan's evaluation quality assurance system (GEROS), based on the UNEG norms and standards and good practice of the international evaluation community were adhered to throughout the evaluation. GEROS was systematically applied by all stakeholders involved with this evaluation by both the team leader and KonTerra's internal Quality Assurance (QA) expert utilising all relevant technical notes, templates and checklists as detailed in Annex 9.<sup>72</sup>

## 4.7 Ethical considerations

48. The team considered ethical obligations throughout the evaluation, guided by the 2020 revised UNEG/UNICEF Ethical Guidelines which emphasize five core principles: integrity (honesty and transparency in evaluation processes), accountability (responsibility to stakeholders and adherence to professional standards), respect (dignity and rights of all participants), beneficence (minimizing harm and maximizing benefits), and justice (fair distribution of evaluation benefits and burdens, with particular attention to vulnerable groups).<sup>73</sup> Management arrangements were sufficient to ensure **independence** and **impartiality**. The ET had **no conflicts of interest**. All team members signed and upheld the UNEG/UNICEF Code of Conduct for Evaluation in the United Nations system.<sup>74</sup> The evaluation design and execution adhered to revised UNICEF evaluation policy (2023),<sup>75</sup> UNICEF Policy on Personal Data Protection (2020),<sup>76</sup> UNICEF procedure on ethical standards in research, evaluation, data collection and analysis (2021),<sup>77</sup> and UNEG and UNICEF prescribed evaluation norms, and standards among several other guidance documents on evaluation ethical guidelines. **Credibility** was ensured through rigorous evaluation methodology, evaluation team competence and diverse stakeholder engagement. In the interest of **accountability**, this report will be made publicly available. The evaluation design was approved through the institutional review board (IRB) process prior to implementation.

49. Data collection employed relevant **ethical safeguards** to ensure that all stakeholder groups were treated with integrity and respect. When engaging with communities, respect for **dignity and diversity** was ensured through three approaches: (1) accessible data collection tools, (2) local interviewers trained in cultural sensitivity, and (3) methodologies designed to capture diverse voices and perspectives, particularly those of women and marginalized groups, to enhance inclusivity and relevance of the evaluation outcomes. Data collection at the community-level was conducted with same-gender enumerators i.e. men interviewed men and women interviewed women. Special attention was given to **avoidance of harm**, respecting the sensitivities of topics, such as safety concerns experienced during water collection.

50. Informed consent and voluntary participation were ensured at the onset of data collection activities. Interviewers provided full disclosure of the evaluation context, including potential risks or benefits, and informed all respondents of their right to decline participation or withdraw at any time. Data collection activities ensured **fair representation** of participants through sampling strategies seeking diverse populations and actively seeking input from marginalized or underrepresented groups (particularly focusing on including women in data collection). **Confidentiality** was ensured through secure data storage, limiting access to only

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<sup>72</sup> For more information on Quality Assurance, refer to Annex 9.

<sup>73</sup> UNICEF. (2021). UNICEF Procedure for Ethical Standards in Research, Evaluation, Data Collection and Analysis. Available at: <https://www.unicef.org/evaluation/media/1786/file/UNICEF%20Procedure%20on%20Ethical%20Standards%20in%20Research,%20Evaluation,%20Data%20Collection%20and%20Analysis.pdf>.

<sup>74</sup> UNEG. (2008). UNEG Code of Conduct for Evaluation in the UN System. Available at: [https://www.unevaluation.org/unevaluation-publications/unevaluation-code-conduct-evaluation-un-system](https://www.unevaluation.org/unevaluation/unevaluation-publications/unevaluation-code-conduct-evaluation-un-system).

<sup>75</sup> UNICEF. (2023). Revised Evaluation Policy of UNICEF. Available at: <https://www.unicef.org/executiveboard/revised-evaluation-policy-unicef-srs-2023>.

<sup>76</sup> UNICEF. (2016). UNICEF Policy on Personal Data Protection. Available at: <https://www.unicef.org/supply/media/5356/file/Policy-on-personal-data-protection-July2020.pdf>.

<sup>77</sup> UNICEF. (2021). UNICEF Procedure on Ethical Standards in Research, Evaluation, Data Collection and Analysis. Available at: <https://www.unicef.org/evaluation/media/1786/file/UNICEF%20Procedure%20on%20Ethical%20Standards%20in%20Research,%20Evaluation,%20Data%20Collection%20and%20Analysis.pdf>.

authorized personnel and anonymizing transcripts before analysis. The team certifies that there is no possibility to trace back specific findings to individual respondents.

#### 4.8 Limitations, mitigation measures and constraints

51. There are some important limitations that impacted the evaluation. Table 8 lists the primary limitations affecting the evaluation. The Findings sections include specification of impacts on specific areas of inquiry.

**Table 8 Evaluation limitations, mitigation measures and impact on the evaluation**

Limitation	Mitigation measure and impact on evaluation
There was no systematic monitoring of functionality post construction	The primary purpose of this evaluation was to identify the key factors affecting functionality (sustainability) to identify important lessons learned to improve functionality going forward. To this end, primary data collection tools were designed with a significant focus on functionality issues. However, primary data collection can only provide findings for selected provinces; there is no feasibility to provide an overall judgement on the functionality of all systems implemented. Furthermore, while consistent issues identified between provinces suggest that these are the key issues affecting functionality (sustainability), the ET is unable to triangulate these judgements with secondary data. This limitation particularly affects Effectiveness and Sustainability criteria as well as the overall conclusions.
Limited availability and utility of Third Party Monitoring (TPM) reporting and a lack of disaggregation in available TPM reports	TPM report findings are inconsistently disaggregated by type of water system. The ET used very limited TPM datasets to analyse underlying data points where available. <sup>78</sup> In the absence of this, the ET triangulated TPM findings with findings from primary data collection to the extent feasible and asked KIIs whether specific TPM findings applied to solar systems. However, evaluation time constraints limited the ET's ability to fully interrogate the applicability of all TPM findings leading to some ambiguity which is acknowledged in the findings.
Limited availability of disaggregated data from secondary sources	Primary data collection is disaggregated by gender and disability where relevant and feasible within the reporting timeline to identify diverse perspectives. However, lack of disaggregation in secondary sources could not be mitigated. This limited the ET's ability to understand issues of equity within the Relevance and Cross-cutting issues criteria. To partially compensate for this gap, the ET prioritized disaggregated analysis in primary data collection, including gender-disaggregated household questionnaires, separate consultations with women and men, and targeted outreach to households with people with disabilities to strengthen evidence on differential experiences and equity outcomes.
The planned water quality testing was not completed by UNICEF Afghanistan <sup>79</sup>	This was only determined after the methodology of the inception report was approved, thus limited mitigation was possible. The evaluation utilised perception data of water safety by communities alongside a review of water safety issues in documentation to identify potential risks to water safety. However, without water quality testing, the evaluation cannot confirm access to safe water, only access from an improved source. This also reduced the scope for assessing potential health impacts at the household and community level.
Limited reflection of donor feedback	Though the solar water systems are funded through a large number of donors, the evaluation team had to focus on USAID as the primary donor (vis-à-vis all different funding sources utilized) due to time constraints. This limitation was substantially mitigated because UNICEF Afghanistan's annual reporting to USAID encompasses all solar water systems regardless of funding source, providing comprehensive system-level data. The evaluation included KIIs with UNICEF Afghanistan staff overseeing donor relationships to understand partnership dynamics more broadly, supplemented by review of USAID correspondence that provided insight into the quality of this key donor relationship.
Issues in sampling frame required replacements reducing the time for data collection	The sampling frame was discussed in detail during the inception stage. However, during data collection, it was found that a number of villages included in the sampling frame were errors where no SWS had ever been installed (confirmed through WASH Zonal office consultations and community members). This

<sup>78</sup> Where TPM datasets are reported in the findings, this refers only to Apex TPM datasets from December 2023-March 2024 and October 202. The Team Lead coordinated with both the previous and current UNICEF ACO IMs, but a solution was not identified to access more comprehensive datasets.

<sup>79</sup> The upcoming income, expenditure, and labour force survey will cover this, and the UNICEF WASH team did not want to duplicate efforts.

	resulted in a number of days lost for data collection. Replacement villages were selected from the same provinces to maximize the sample reached. However, this reduced the representation of older systems the overall sample size reached for the HHQ, O&M questionnaire, and physical observation.
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## 5 FINDINGS

### 5.1 Relevance

**To what extent is the programme design, model, and approach to improve water supply systems in Afghanistan relevant and appropriate to the needs of beneficiaries?**

**Key findings:** UNICEF Afghanistan showed strong adaptability maintaining participatory approaches (community consultations reported within 93 per cent of observed SWSs; 85 per cent of users “fully satisfied” with levels of participation in water management) while responding to shifts in community governance including CDC dissolution in 2024, large-scale displacement, and reduced space for women’s engagement after 2021. CDC dissolution disrupted coordination, prompting a hybrid model combining private-sector delivery with strengthened community structures, though still untested. Groundwater decline and population growth, especially returnees, strained system capacity.

#### **EQ1.1 To what extent and how were local stakeholders, including women, marginalized groups and local community members, involved at each stage of the project?**

52. **The recognition for the need for more sustainable service delivery models prompted an increased focus on community-level O&M arrangements.** Expectations for community participation in these systems were formalized in the Afghanistan Rural Water Supply Operation and Maintenance Strategy (2020-2030).<sup>80</sup> Underpinning the strategy was a recognition that O&M of rural water supply systems is essential to ensure efficiency, effectiveness, and sustainability of water supply services for community members in Afghanistan. Core to these standards was an approach emphasizing community ownership of key processes “local users, including women, children, the elderly and people with disabilities, should be actively involved in decision-making processes from the first stage (planning) all the way through to implementation.”<sup>81</sup>

53. **UNICEF staff, extenders, and I(NGO) partners report consistent consultation with community stakeholders during the planning and design stage, though secondary data is not sufficient to confirm the extent to which consultations systematically included different segments of the population.** UNICEF Afghanistan stakeholders described regular efforts to involve community members in a series of planning activities acknowledging increasingly persistent gaps in the ability to include women due to contextual restrictions, particularly the ban on women working. Key informants felt that inclusion standards were met by providing accessible means of participation and representation, including open meetings, door-to-door feedback collection, and simple complaint mechanisms. Community stakeholders generally affirmed participation in siting locations for water points and wells, a key criterion for the quality of design per the SWSC guidance.<sup>82</sup> Additionally, O&M personnel in nearly all visited SWSs (93 per cent) reported that community meetings were held prior to installation suggesting consistent involvement of community members at the design stage. This primary data was triangulated by examples of documented processes provided by UNICEF Afghanistan. For example, the evaluation team reviewed meeting records, core communication materials, water resource and hazard mapping exercises conducted with CDCs, and documentation of problem identification, prioritization, and corresponding solutions from Logar Province.<sup>83</sup>

54. However, it was not possible to triangulate these findings with secondary data to determine how systematically these activities were conducted outside the areas of primary data collection and with what population groups. Design activities are described in broad terms across internal and donor-facing reporting. UNICEF made reference to the inclusion of women, people with disabilities, and “other vulnerable populations” to varying degrees depending on the specific report. However, there is no systematic documentation of how consultations were conducted or who was involved.<sup>84</sup> There has been a great deal of variance in the way these activities were conducted and whether they were conducted at all. Such processes

<sup>80</sup> MRRD, Ru-WatSIP, and Water and Sanitation Group (WSG). (2020). Afghanistan Rural Water Supply Operation and Maintenance (O&M) Strategy 2020-2030. Available at: UNICEF Sharepoint (no link available)

<sup>81</sup> MRRD, Ru-WatSIP, and Water and Sanitation Group (WSG). (2020). Afghanistan Rural Water Supply Operation and Maintenance (O&M) Strategy 2020-2030. Available at: UNICEF Sharepoint (no link available)

<sup>82</sup> UNICEF and UNDP-SIWI Water Governance Facility. (2021). Sustainability Check Tool: Guidance for designing and implementing Sector-Wide Sustainability Checks in WASH. Available at: <https://knowledge.unicef.org/CEED/resource/unicef-sector-wide-sustainability-check-tool-guidance-designing-and-implementing-sector>.

<sup>83</sup> UNICEF. (2023). CDC WASH Development Plan, Qala-e-Nora 2023. Available at: UNICEF Sharepoint (Internal Document)

<sup>84</sup> UNICEF is making changes to the types of data stored in ActivityInfo to more systematically capture data points of interest; there is currently no data on community consultations recorded.

are evolving and unique to each community’s specific context due to the security and governance changes in the country.

55. **Community members reported high satisfaction with how decisions were communicated and handled, regardless of their own levels of participation.** Levels of community involvement in decision-making were asked in both the O&M questionnaire and the HHQ. Most water users and O&M personnel reported that community members were at least informed about decisions related to water system management, if not actively involved. Involvement in key decisions is also reflected in the household data where nearly three-quarters of water users in the HHQ (71 per cent) reported that at least one person from their household was involved in discussions or meetings about setting the water fee/tariff.<sup>85</sup> Overall, community users in the HHQ were largely satisfied with their level of involvement, with 85 per cent reporting to be ‘fully’ satisfied and an additional 13 per cent ‘somewhat satisfied’. Importantly, this level of satisfaction was high both among users that reported being informed only (86 per cent ‘fully satisfied’) as well as those who reported that water users were actively involved (90 per cent ‘fully satisfied’, Table 9).

**Table 9 Community involvement in decision-making about water systems**

	Reported HH involvement	% of respondents ‘fully satisfied’ with involvement
Not informed/involved	6%	61%
Informed only	62%	86%
Involved (has a say in decisions)	32%	90%
Refuse to answer	1%	n/

Source: HHQ and O&M questionnaire. The figures do not add to 100% as they are rounded based on ERG request.

56. **Active involvement in decision-making mechanisms was largely limited to men.** NGO workers and extenders interviewed through the AI, as well as UNICEF KIIs, reported that WUCs sometimes include women, older persons, and people with disabilities, but that such inclusion is inconsistent. As no secondary data on WUC membership was systematically available, it is not feasible to characterize inclusion of different population groups more broadly, though UNICEF documentation highlights limited participation of women in WUCs.<sup>86</sup> For example, in a 2021 WSP training report, of the 99 WSP committee members trained, only 4 were women.<sup>87</sup> The WASH Field Note based on ActivityInfo<sup>88</sup> Access to Water sheets include a value for women trained from 2023 onwards, but no values are recorded for solar system installation. In qualitative data, community members generally described decision-making processes as open and inclusive process for male members of the community. However, the involvement of women and vulnerable groups in community decision-making about SWSs was more limited, with decreasing space under the de facto government. In IDIs women, most women highlighted that women were completely excluded from public decision-making processes, though most expressed confidence that male intermediaries could reflect their needs with a minority expressing dissatisfaction. Exclusion from decision-making was also reported by nearly a third of HHQ service users (31 per cent of HHQ respondents reported that some people were excluded from decisions about water services). In quantitative data, those reporting exclusion from decision-making were most likely to highlight exclusion of new arrivals and of household further from the water system. Exclusion of poorer households and women in the community were reported to a lesser extent in quantitative data. Consultation with UNICEF Afghanistan stakeholders also highlighted how the elimination of women in public facing roles is having a detrimental effect on representation of other vulnerable groups. This is within the wider context of de facto government restricting space for powerbrokers beyond largely elderly clerics.<sup>89</sup> Importantly, marginalization in Afghanistan is a complex dynamic primarily driven by diverse and interrelated characteristics, including gender inequality, ethnic and identity divisions, and extreme poverty. Determining who is the most marginalised and how to ensure their representation in community decisions will require localised considerations.

57. **Outside of specific community planning exercises, the strategy of channelling community representation through CDCs resulted in variable levels of inclusion.** The inclusivity of the CDCs varies

<sup>85</sup> Both women and men were asked if they or someone from their household was involved in water fee/tariff setting.

<sup>86</sup> UNICEF. (2020). Improved Operation and Maintenance and Revenue Collection from Metered Water Supply Systems: Lessons from Rural Afghanistan. Available at: <https://www.unicef.org/rosa/media/12191/file>.

<sup>87</sup> DACAAR. (2021). WSP Summary Report: 2nd Quarter 2021.

<sup>88</sup> ActivityInfo is a web-based information management platform designed for humanitarian and development organizations to collect, manage, and analyse project data.

<sup>89</sup> Alsousi, M., & Alarabed, W. (2025). Religious Scholars and Political Influence in Afghanistan After 2021: Between Legitimacy and Control. Available at: <https://doi.org/10.1177/15423166251356634> (Original work published 2025)/

between communities. In some communities, activities such as site selection, engagement with community mobilization, planning and decision-making, Water Safety Plan (WSP) development, and regular meetings demonstrated successful inclusion practices. In others, exclusion was noted with lack of regular meetings, lack of participation in design reviews, monitoring and feedback, as well as in community mobilization, coordination and decision-making. This variability is reflected in the broader literature emphasizing that despite the CDC system's stated commitment to inclusive participation, implementation revealed significant gaps, with formal structures often superseded by informal, elite, and male-dominated leadership networks that limited the meaningful involvement of women and marginalized groups.<sup>90</sup>

58. **UNICEF Afghanistan stakeholders reported changes to the model of community inclusion post CDC dissolution to expand and standardize outreach activities.** Interviewed staff conveyed how they came to regard "dissolution as an opportunity" for standardization and extension. Focus was placed on adequately equipping WUCs and ensuring that standardized practices and materials were in place, e.g., tools, receipt books, etc. This strategy has extended to Field Office operations with some officers providing examples of their community mobilisation materials. These materials differed between provinces.

### **EQ1.2 To what extent did the project remain relevant to changing needs and priorities of beneficiaries?**

59. Implementation of SWS installations occurred over a significant time period, spanning major contextual changes. Based on stakeholder consultations during the IR, this EQ focuses on the ability of SWS implementation strategies to remain relevant and households having access to safe drinking water in light of three primary changes over the implementation period: 1) Reducing space for women's engagement following the government transition, 2) Changes in community governance structures, 3) Changes in community dynamics considering large-scale population displacements. A final sub-section explores other relevant changes identified during data collection.

#### **Changes in ability to engage with women**

60. There are longstanding barriers to women's participation in water governance at the community level, pre-dating the political transition.<sup>91</sup> As discussed in EQ1.1, there was a broad commitment to women's involvement throughout the process of SWS planning, installation and governance in line with the National O&M strategy. KIIs underscored that UNICEF Afghanistan and ministry stewardship prior to the political transition ensured that women could be involved at minimum in site selection for public tap systems. There were also more opportunities for women's inclusion in water governance, notably through CDCs, which previously included women to varying extents.<sup>92</sup> Beyond inclusion in SWS-site specific activities, data collected also pointed to specific activities to rectify limited involvement of women in the WASH, such as gender mainstreaming trainings. This included capacity building for 35 provincial engineers from MRRD on integrating gender considerations into rural water supply initiatives and implementation, focusing on security enhancements and women's participation in governance processes at the Community Development Council level. More broadly, UNICEF Afghanistan has been engaged in attempts to ensure data-driven gender-responsive programming approaches.<sup>93</sup> However, even with these efforts, reviewed secondary data, community consultations and UNICEF Afghanistan interviews confirmed a limited ability to engage women in more formalized governance and maintenance roles.

61. **The de-facto authorities have codified barriers to women's participation; UNICEF Afghanistan has limited capacity to engage in this context.** UNICEF Afghanistan continues to advocate to secure exemptions in the short-term and demonstrates flexibility with continuing efforts to end the ban on women working in

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<sup>90</sup> Arne Strand, Magnus Hatlebakk, Torunn Wimpelmann, Mirwais Wardak (2022). Community-Driven Development or community-based development? Available at: <https://www.cmi.no/publications/8342-community-driven-development-or-community-based-development>.

<sup>91</sup> Documentation review e.g. UNICEF Afghanistan Water, Sanitation and Hygiene Programme Strategy Note 2017-2019 and UNICEF. 2020. Improved Operation and Maintenance and Revenue Collection from Metered Water Supply Systems: Lessons from Rural Afghanistan.

<sup>92</sup> While CDC by laws state that they must comprise equal numbers of men and women (Article 7, Islamic Republic of Afghanistan. n.d. "Community Development Council By-Law."), participation of women varied as documented e.g. UNICEF. 2020. Improved Operation and Maintenance and Revenue Collection from Metered Water Supply Systems: Lessons from Rural Afghanistan.

<sup>93</sup> Madhu Malhotra. (2016). Count Me In.... Working Together towards Gender Responsive Water, Sanitation and Hygiene Programming: Review on Integration of Gender in UNICEF WASH Program Afghanistan. Available at UNICEF Sharepoint (internal document). UNICEF. (2017). Gender-Responsive Water, Sanitation and Hygiene: Key Elements for Effective WASH Programming. Available at UNICEF Sharepoint (internal document)

WASH outreach in the long-term.<sup>94</sup> Stakeholders acknowledged limitations to this approach, as restrictions by the de-facto authorities continue with progressively more severe measures. Space for women's public participation has notably deteriorated following recent policy changes, particularly the prevention of vice ruling.

62. **SWS installation remains relevant to address women's needs, regardless of context changes.** As noted in more detail in EQ8.1 and EQ4.1, the benefits of household-level water access are notable for women, especially as women were primarily responsible for water collection from household sources. These benefits include reduced time and physical strain for water collection, increased opportunities for household and food hygiene, and home gardening enabled by improved water availability. Additionally, the evaluation did not identify significant concerns related to potential unintended negative impacts on women given post-2021 restrictions. These findings confirm that the approach of prioritizing household-level installations remains relevant.

### **Community-based WASH governance structures**

63. **CDCs were an essential conduit for SWS installation, from needs identification to installation oversight.** The (de facto) MRRD and UNICEF Afghanistan have relied heavily on CDCs throughout the evaluation period except for a brief pause following the political transition when contracting through the MRRD was stopped to comply with sanctions. Following a directive in April 2022, UNICEF Afghanistan resumed directly funding project implementation through CDCs, citing the limited implementation capacity among (I)NGO and Civil Society Organization partners to meet the considerable need for water in the country.<sup>95</sup> From 2022 onwards implementation has been more evenly split between CDC implementation and (I)NGO implementation.

64. **The dissolution of CDCs in 2024 and the shift to direct contracting with private sector and NGO providers has had notable implications for coordination and community engagement.** In qualitative data, many community members shared that they do not feel connected to or communicated with by stakeholders since CDCs were dissolved. The transition has affected established coordination mechanisms. Stakeholders noted that monthly meetings and clear pathways for raising concerns that existed under the previous framework are now absent or less formalized. Additionally, UNICEF stakeholders reported that the shift from CDC-based implementation (with PRRD-technical backing) to private sector contracting has reduced the role of provincial technical staff who previously provided insight and quality assurance during construction and handover phases. This transition period has created gaps in the feedback loops between communities and implementing entities, despite UNICEF Afghanistan having separate feedback and accountability mechanisms in place.

65. **Reservations expressed by UNICEF Afghanistan KIs about the negative impact of CDC dissolution on community ownership are not strongly reflected in community level data collection; though changes in community's capacity to coordinate through CDC could undermine system sustainability.**<sup>96</sup> UNICEF Afghanistan stakeholders largely expressed concern that the required shift to implementation through the private sector would counteract the sense of community ownership, and reduce motivation and engagement. While community-level stakeholders largely did not express concerns about CDC dissolution impact on their ability to manage day-to-day maintenance needs, FGDs with WUC members and men beneficiaries reported that the dissolution of CDCs could have an impact on coordination, and thus their capacity to request external support. Under the CDC, there was a known point of contact through which they could request assistance from government/de-facto authorities and other stakeholders. Now that the CDC have been dissolved, there has been an impact in so far as people's known pathways for communication, and organization around their issues has been lost, and as yet not effectively replaced in many communities. This is therefore expected to have an impact on communities' ability to effectively maintain and sustain system operation. Furthermore, FGDs highlighted how CDC dissolution has also meant that field monitoring visits and other ad hoc communication has ended, and it was during such interactions

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<sup>94</sup> UNICEF Afghanistan. (2024). Summative Evaluation of the ECHO Supported Humanitarian Water, Sanitation & Hygiene (WASH) Programme in Afghanistan (2022-2023). Available at: <https://evaluationreports.unicef.org/GetDocument?documentID=19993&fileID=54386>

<sup>95</sup> UNICEF Afghanistan. (2022). Note for Record -Working with Community Development Councils (CDCs). Available at: UNICEF Sharepoint (Internal Document)

<sup>96</sup> As this change had only happened recently, the evaluation could not look at any realised impacts of the shift to private sector engagement. However, in community-level data collection, the evaluation explored people's opinions of the impact CDC dissolution would have SWS maintenance and sustained operation.

that key community operational issues were voiced and coordination occurred. Notably, these negative impacts on coordination capacity were not unanimously reported especially in communities where CDCs had not been effective conduits of community need or where communities reported that other structures or community unity more generally had enabled communities to overcome any coordination gaps created by CDC dissolution. This variation was also noted within interviewed de facto authorities. Interviewed de facto authorities from the Central, Eastern, and Southern zones felt that communities had the capacity to shift this role to other local stakeholders. In contrast, the de-facto PRRD interviewees from the North anticipated negative impacts on coordination (and thus sustainability).<sup>97</sup>

66. **UNICEF Afghanistan’s emerging strategy to manage private-sector risks through community structures shows promise, but its relevance remains untested.** UNICEF Afghanistan’s strategy for moderating risks associated with private-sector implementation relies on shifting responsibilities to alternative community structures in a rapidly evolving context. UNICEF Afghanistan KIs discussed a hybrid model that balances community ownership with some level of external project monitoring to moderate potential negative impacts on coordination and community ownership. This revised community mobilization model, adapted for private sector implementation, emphasizes a more systematic approach to participatory planning and the establishment of WUCs and mechanics for operation and maintenance than had previously been implemented. This adaptive approach is evolving in response to the reality that the de facto authorities do not encourage formalization of community structures, requiring UNICEF Afghanistan to develop flexible community engagement mechanisms that can function without formal institutional frameworks.

### **Changes in household or community demand and social cohesion**

67. **There is strong demand for water among returnee populations.** The desk review highlighted the deterioration in water access for both returnees and host communities as water-scarce communities struggle to cope with the increased demand for water.<sup>98 99</sup>

68. **Drought undermines design considerations for SWSs to be able to absorb large population increases.** The solar water systems were engineered with operational capacity expected to account for anticipated population increases over time. However, as noted in the document review and qualitative transcripts, the water level is dropping throughout Afghanistan to the detriment of water access and the productivity of drilled boreholes.

69. **Communities do not have access to the external support required in case population increases occurred.** While community-level qualitative respondents did not highlight any specific impacts of large-scale returnee populations, there was clear consensus from community-level respondents and O&M data that communities did not have the capacity to take on any system expansions themselves to meet any such increased demand for water. Furthermore, qualitative data and quantitative findings from the O&M questionnaire highlight gaps in receipt of timely external support when needed. These gaps undermine the programme’s relevance to respond to changing household/community demand.

70. **Solar water systems have generally supported social cohesion where water supply is sufficient and access is equitable, with no major conflicts reported and community involvement in planning helping to mitigate installation-related tensions.** However, emerging water insufficiency in some areas poses a risk of low-level conflict, as declining groundwater and drought intensify competition among users, indicating that sustained social cohesion depends on maintaining adequate and reliable water supply.

71. Strategies to strengthen community engagement can help overcome future ownership issues, but lowering groundwater levels could increase social cohesion risks. WASH stakeholders identified ongoing revisions to strategies to improve community engagement. The goal of these revisions was to provide communities with a better understanding of the project scope and their responsibilities within it, to increase the sustainability of SWSs. UNICEF Afghanistan stakeholders also highlighted recent interventions focused on groundwater discharge and the future consideration of water recharge interventions, like check dams or recharging wells as an emerging area of promise to ensure the wells themselves had the capacity to respond to population increases. Positive examples highlighted successfully upgrading water supply systems with house-to-house connections using booster pumps instead of elevated reservoirs, which provides consistent

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<sup>97</sup> Unfortunately, no de-facto PRRD stakeholders were available for interview for the Western region.

<sup>98</sup> Mercy Corps. (2025). Crisis Compounded: Afghanistan Returnees Face an Escalating Water Emergency. Available at: [https://reliefweb.int/attachments/8a140ec8-326e-43fb-90cc-51e48903df5e/Final\\_MC-Afg-Water-Returnees.pdf](https://reliefweb.int/attachments/8a140ec8-326e-43fb-90cc-51e48903df5e/Final_MC-Afg-Water-Returnees.pdf).

<sup>99</sup> The Water Diplomat. (2025). More than 1,5 million Afghans return from Iran amid acute drought and deportations. Available at: <https://www.waterdiplomat.org/story/2025/08/more-15-million-afghans-return-iran-amid-acute-drought-and-deportations>.

water pressure and allows for household-level water storage, effectively urbanizing communities, meeting increased demand, and mitigating any associated potential risks to social cohesion. UNICEF Afghanistan’s broader engagement in strengthening the enabling environment (discussed in EQ3.2) contribute to mitigating potential social cohesion risks amid the wider context of deteriorating water availability.

### Other adaptations

72. UNICEF Afghanistan has demonstrated strong adaptability, absorbing lessons learned and contextual changes throughout the period of implementation to meet changing needs. Other adaptations, aside from those discussed above are highlighted in Table 10 below.

**Table 10 UNICEF Afghanistan adaptation to lessons learned and contextual changes**

Adaptation	Relevance
WSP introduction	In 2017, UNICEF Afghanistan piloted WSPs in 32 villages using hand pumps. UNICEF Afghanistan developed a lessons learned document in 2019 following the WSP pilot which was extremely positive of the process, recommending further rollout of the pilot based on a ‘quick assessment’ of 2 (of the 32) villages where WSPs had been introduced. <sup>100</sup> Interviewed UNICEF Afghanistan stakeholders echoed this positivity based on broader field experience in WSP implementation, noting benefits of increasing the effectiveness/sustainability (and thus relevance) of SWSs. O&M questionnaire data shows that SWSs were slightly less likely to be affected by extreme weather events at either the water source or water points in communities where WSP’s were developed compared to communities where no WSP was reported to be developed. <sup>101</sup>
Inclusion of urban and peri-urban areas	Following the government transition, UNICEF Afghanistan expanded its rural water supply programme into urban areas to prevent sector collapse including a small proportion of total SWS beneficiaries and systems. <sup>102</sup> The relevance of the SWS in urban areas was not within scope of this evaluation which focused on rural areas. However, where implemented, UNICEF Afghanistan WASH stakeholders were positive that SWSs could provide for urban water needs.
Expansion of coverage	Following the government transition, UNICEF Afghanistan took advantage of the increased security and access conditions to expand service delivery to newly accessible areas (see Figure 2). The continuation of site-level assessments ensured that installations were relevant for community needs.

## 5.2 Effectiveness

**To what extent were the stated objectives and set targets of the programme achieved, and how effectively have the programme interventions facilitated access to WASH services for the affected population?**

**Key findings:** The programme was largely effective in improving access to water through the expansion of solar-powered water systems aligned with SDG 6 and UNICEF objectives, with targets exceeded once targets for solar installations were introduced. The shift toward higher service levels, especially household-level connections, improved accessibility, with SWSs accounting for the main source of drinking water for 87 per cent of users, demonstrating strong effectiveness in meeting essential drinking needs. However, overall effectiveness was constrained by frequent system breakdowns, long repair times, limited daily and seasonal availability, and insufficient water quantities to meet broader household needs, particularly in areas with older systems. Despite these limitations, user satisfaction remained high (76 per cent “completely satisfied” with the water system), underscoring the significant value of more reliable drinking water access in a highly constrained setting.

### EQ 2.1 How effective are the systems for improving access to functional, accessible, available, affordable, sufficient and safe water?

73. The evaluation found that 75 per cent of observed solar-powered water systems continue to provide at least some water services to communities, representing UNICEF Afghanistan’s fundamental achievement in expanding rural water access.<sup>103</sup> This service provision rate demonstrates effective service delivery despite

<sup>100</sup> UNICEF. (2019). Piloting the implementation of Water Safety Plans through CLTS teams in Afghanistan. Available at: <https://www.unicef.org/rosa/media/11776/file>.

<sup>101</sup> The differences are marginal and the sample size is too small to determine any significance of these differences. In SWS where WSPs had been developed, 41% of O&M respondents reported that their system had been impacted by extreme events. This compared to 54% of O&M respondents in SWS where no WSP had been developed.

<sup>102</sup> Based on ET analysis of Activity/Info Access to Water sheets, urban areas accounted for 17% of systems installed in 2022, 3% in 2023 and 8% in 2024. The reach of these urban systems was particularly large in 2022 where urban areas accounted for 47% of total people benefitting from solar systems that year. Data is not disaggregated by urban/rural designation for 2016-2021.

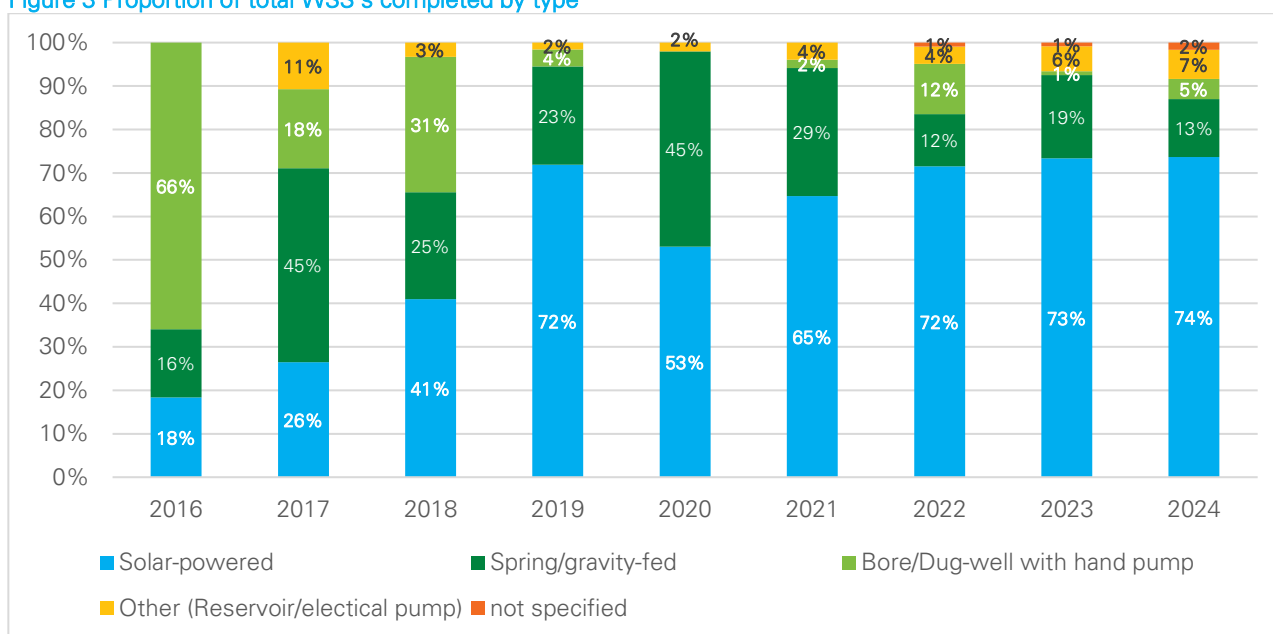
<sup>103</sup> More details are provided under ‘Sustainability’ section.

challenging operational contexts and provides the essential benchmark for assessing service quality. The detailed analysis that follows examines the effectiveness of SWS's in supporting UNICEF's objective to move towards higher levels of service followed by an assessment of effectiveness based on criteria defined by the UNICEF SWSC guidance, alongside variations according to system characteristics. This further analysis highlights areas for future attention to improve service quality and sustainability.

### Moving towards a higher level of service

74. SWS's have supported UNICEF Afghanistan WASH's objective to move towards more renewable and higher levels of service in line with the organizational strategy, national policy objectives, and SDG6.1 objectives. For most of the implementation period, targets for water supply were general, without specific targets set for the provision of water through solar-powered systems as opposed to other energy sources. A specific indicator was added for the number of solar powered water systems in 2023 with targets over-achieved for this year.<sup>104</sup> More broadly, the move towards providing an increasing proportion of water supply services through solar-powered sources evidenced achievement of UNICEF ACO's ambition to move towards systems that they anticipated to be more sustainable compared to handpumps. The share of solar-powered water systems as a proportion of all WSS's completed grew from 18 per cent in 2016, to over 50 per cent for all years since 2019 (Figure 3).<sup>105</sup>

Figure 3 Proportion of total WSS's completed by type



Source: UNICEF Afghanistan. ActivityInfo Access to Water datasets for 2021-2024. Downloaded June 2025.

75. The growing share of solar-powered systems supplying household-level taps, rather than public taps, demonstrates UNICEF Afghanistan's effectiveness in advancing global and SDG6 objectives for improved water service provision. This was evidenced by the share of household-level solar systems increasing from 53 per cent of systems completed in 2016 to 92 per cent of systems completed in 2024 (Figure 4).<sup>106</sup> Based on ActivityInfo data, nearly all of these household level connections were metered.<sup>107</sup>

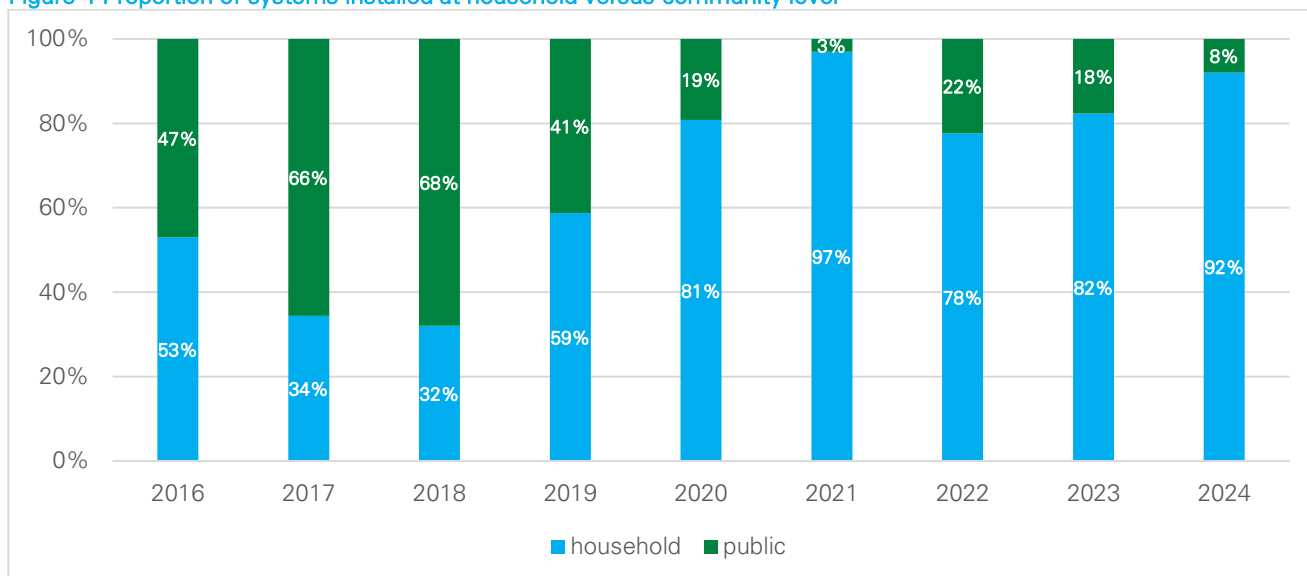
<sup>104</sup> According to the 2023 Combined outcome/output reports and end-year summary narrative, 264 systems were completed, over-achieving the target of 228. The ET had access to the 2024 Results Assessment Module narrative but not the updated indicator reporting.

<sup>105</sup> Based on ActivityInfo data received. Prioritization of solar and gravity-fed schemes over traditional bore wells with hand pumps is a specified ambition in the reviewed Programme Strategy Note's covering 2017-2024. UNICEF reporting emphasizes the sustainability of gravity-fed and solar systems over handpumps. No data was presented in any reviewed UNICEF documentation comparing the sustainability of different WSSs to substantiate this claim. However, KIs affirmed that solar systems were more sustainable than hand pumps, evidenced through their experience in WSS management.

<sup>106</sup> Numbers compiled by the ET based on: UNICEF ACO. (2025). ActivityInfo Access to Water datasets for 2021-2024. Available at: <https://www.activityinfo.org/app#database/cngjzx9l7puu83e2> (access required)

<sup>107</sup> A small number of household systems did not include metering in 2019 (51 of 54 systems), 2020 (18 of 21) and 2021 (30 of 32 systems).

Figure 4 Proportion of systems installed at household versus community level



Source: UNICEF Afghanistan. (2025). ActivityInfo Access to Water datasets for 2021-2024

76. **The majority of users relying on solar water as their main source of water have “basic” water access to water.** These values are in line with national averages (see Table 1). Most surveyed households relied on solar water located on premises (81 per cent) for their main source of drinking water with a smaller proportion relying on a public tap (19 per cent; two users reported using solar water from a neighbour’s plot). The proportion of those relying on water on premises was larger for systems completed post 2021 (56 per cent) compared to those systems completed by 2021 (35 per cent) confirming UNICEF’s increasing attention to providing water at household level (see Figure 4). However, as discussed below in the paragraph on availability, the fact that water was not available when needed for many users reduced achievements in moving up the service ladder. There was large provincial variation with higher levels of service in Uruzgan and Jawzjan compared to Badghis. This was driven by the fact that a higher proportion of users in Badghis were served by older systems (which had worse availability rates, discussed in EQ3.1) and systems providing water at the community level (which were less likely to be accessible within 30 minutes).

Table 11 SDG ladder achievement (of HHQ reporting solar water as their main source of water)

Service level	Overall	Badghis	Jawzjan	Khost	Laghman	Uruzgan
Basic+ <sup>108</sup>	32%	15%	44%	30%	22%	46%
Basic	55%	62%	35%	56%	69%	53%
Limited	13%	23%	21%	14%	9%	1%

Source: HHQ based on those using water from the solar system as their main source of drinking water (n=482).

### SWSC criteria assessment<sup>109</sup>

77. **Functional:** There were consistent concerns with the functionality of SWSs attributed primarily to regular system damage/breakages. Positively, about a third of HHQ SWS users (32 per cent) reported always having access to water in the past month. Another 22 per cent said water was almost always available, with taps failing only once or twice, while 33 per cent experienced a few interruptions (three to five occasions). Only 13 per cent of users reported frequently turning on the tap and finding no water. Functionality appears most often related to system breakages. Nearly all O&M personnel (82 per cent) reported that the system had broken down at least once causing it not to function;<sup>110</sup> a similar proportion of household users (89 per cent) reported that the system had broken at least once requiring a repair. These quantitative findings were triangulated by qualitative data among community-level respondents with stakeholders emphasizing regular infrastructure damage and breakdowns. Even minor damage, such as pipe damage/leaks and damage to

<sup>108</sup> Basic+ is included by the evaluation team to differentiate between those users with access to basic water (as defined by the updated JMP service ladder) with those users that meet two of the three JMP service ladder criteria for safely managed that were assessed through the evaluation: 1) located on premises (within the dwelling, yard or plot); and 2) available when needed. As the planned UNICEF water quality testing was not completed, the ET cannot confirm the provision of safely managed water as this requires confirmation that water is free from fecal and priority chemical contamination.

<sup>109</sup> See Annex 6 for further explanation and definition of the key indicators based on UNICEF SWSC guidance

<sup>110</sup> This rate was higher among O&M respondents for systems completed pre 2021 (92 per cent) compared to those respondents for systems completed post 2021 (69 per cent).

water taps at household and community level, could cause system shutdowns for days as the repairs were fixed. Qualitative data suggests that breakdowns varied in nature from regular leakages and damage to parts (such as water taps) to larger breakdowns in major components (solar panels and submersible pump).<sup>111</sup> The average downtime during the last outage as reported in the O&M questionnaire among systems that were still functioning was 55 days with wide variation between systems (ranging from a minimum of 1 day to a maximum of over a year).<sup>112</sup> Nearly a quarter of HHQ users (23 per cent) suggested that their SWS would see improvements if systems were repaired more quickly. Furthermore, when asked if they had any concerns about the system, 11 per cent of HHQ participants reported that systems frequently break down and 15 per cent reported that water was not 'consistently available'.<sup>113</sup>

78. **Accessible: UNICEF Afghanistan's increasing focus on providing water at household level and community-level consultations increased water accessibility.** Water was generally accessible with most users (85 per cent) within a 30-minute round-trip, including queuing time, to collect water from the water point. Over half of users reported water collection took under five minutes (62 per cent). A minority of HHQ users reported access challenges including that their house was too far from the tap stand (6 per cent) or long wait times or crowding at the taps (9 per cent). In qualitative data, users stressed that the location of public taps had been selected in consultation with users, improving the accessibility. While there is limited secondary data to triangulate, review of the available Apex TPM datasets confirms that public taps were in a centralized area and covered 15-25 families within 200m in line with national standards.<sup>114</sup> Despite generally high accessibility indicators, shared taps in communal yards still require women to navigate complex family and gender dynamics, which was a concern for some. Qualitative data from women emphasized the need for taps within individual homes, as up to twenty families often live together and share the same communal yard. The frequency of shared taps among multiple families was also commonly reported in the O&M data, where most systems visited did not have sufficient taps to provide one tap per household.<sup>115</sup>

79. **Available: The combination of reliance on solar power and limited water quantities reduced water availability.** Less than half of users (42 per cent) reported that the water points are open/available "when needed".<sup>116</sup> Availability was also affected by significant seasonal and weather-related impacts on water availability. Nearly half (44 per cent) of users reported lower availability in winter, 32 per cent reporting lower availability in summer and 35 per cent reporting lower availability during cloudy/rainy weather.<sup>117</sup> These seasonal and weather-related impacts were similarly reported in qualitative data where users relied on alternative water sources (both improved and unimproved) in periods of limited water availability. No user in qualitative data reported sufficient storage capacity to overcome longer periods of availability constraints. In addition, water was available for very limited hours per day. In the O&M questionnaire, O&M personnel reported water availability for an average of approximately five hours per day with large variation between systems. In qualitative data, users similarly reported only a few hours of water per day,<sup>118</sup> and many users reporting water only on every second or third day due to rationing between villages. In qualitative data, nearly all women stressed the importance of storing water to ensure sufficient access given the limited hours per day and functionality issues.

80. **Affordable: Low or no water fees meant water was affordable for most users.** Nearly a third of SWS users did not pay any regular fee/tariff to use water (31 per cent). Gaps in agreements for payments were similarly noted in available TPM data.<sup>119</sup> Of those paying a regular fee in the HHQ and O&M questionnaire, most respondents reported fixed fee rather than consumption-based fee schedules.<sup>120</sup> The fees paid showed large variance between communities (Table 12). This variance is triangulated with available TPM datasets

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<sup>111</sup> The reason for the last breakdown was not asked in quantitative tools.

<sup>112</sup> Average duration of breakdowns was longer for older systems (completed by 2021, average of 84 days) compared to newer systems (completed after 2021, average of 21 days)

<sup>113</sup> "Consistency" was not predefined by a set time/duration. This was a self-reported concern by HHQ respondents.

<sup>114</sup> Only 7 observations were included in available TPM datasets provided to the ET.

<sup>115</sup> Of the 74 sites visited, 21 (29%) had enough taps to provide each household access.

<sup>116</sup> "When needed" was self-reported by users. It was not pre-defined based on a set number of hours.

<sup>117</sup> This was a multiple-choice question. Availability was self-defined by the HHQ respondent. The question asked, "Are there certain types of weather or seasons of the year when water from the solar powered water source is available less?"

<sup>118</sup> In qualitative data, users were generally aware of an agreed schedule of valve operation with clear compliance to the agreed schedule.

<sup>119</sup> Reviewed TPM datasets similarly highlight lack of user agreements to pay fees.

<sup>120</sup> Among HHQ users paying a regular fee, most (68 per cent) paid a monthly fee rather than a consumption-based fee (27 per cent). These values were similar in the O&M questionnaire where 72% paid a fixed fee with the remaining reporting consumption-based fees.

where values ranged from 0-100AFS/m3.<sup>121</sup> Water meters did appear to encourage consumption-based pricing where they were functioning. HHQ users with a functioning meter were much more likely to report consumption-based tariffs (27 per cent) compared to those with no meter (2 per cent). Given the economic constraints to communities, it would be reasonable to assume that consumption-based pricing would reduce overuse of water where implemented, though this could not be determined through primary data collection.

**Table 12 Water fee range among those with regular tariffs (AFS)**

	HHQ (n=245)			O&M questionnaire (n=47)		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum
Monthly fee	83	20	400	103	12	500
Fee per Liter	1.4	.015	4	2.1	1	9
Fee per m3	n/a	n/a	n/a	7.5	5	15

Source: HHQ and O&M questionnaire

81. Affordability was not a major issue in quantitative or qualitative data. Over half of users reporting any regular fee (62 per cent) reported that the cost of operating the water system was ‘easily affordable’ with an additional 31 per cent reporting that fees were ‘manageable’. This was triangulated by the O&M questionnaire where the majority of respondents from the systems where regular fees were paid reported that ‘most’ or ‘all’ households paid the fees. When asked whether they have concerns about the water provided by SWS, very few HHQ users reported concerns that water was too expensive (3 per cent). Likewise, when asked to suggest solutions to water availability issues, few recommended a decreased tariff (2 per cent). Notably, there was not a notable variation between households with a member living with a disability (62 per cent), as compared to other households (60 per cent) when asked if they found the costs of water affordable. In this regard, households with a member living with a disability (8 per cent) were only marginally more likely than other households (7 per cent) to report that it would be impossible for them to pay the fees for their SWS without assistance. Qualitative findings were similarly positive. Community members that did pay fees were largely positive about affordability outside of a few particularly vulnerable households. In one community, where affordability was a more widespread issue, community stakeholders reported that the elders decreased the fee to make it more affordable. Additionally, in the O&M questionnaire, most respondents reported either formal or informal mechanisms for households to still receive water even if they could not pay. These mechanisms were similarly triangulated in qualitative data as well as some secondary documentation.<sup>122, 123</sup>

82. Interestingly, among users not paying a regular fee, perceived affordability was lower, with only 45 per cent of all users not paying a regular fee reporting water was ‘easily affordable’ (compared to 62 per cent of those paying a regular fee). The pattern suggests that regular fees may support perceived affordability. This could reflect that predictable fees reduce the likelihood of unexpected, ad hoc payments for maintenance, or that systems with regular fees have overall lower fee structures. Both interpretations point to a potential benefit of regularized fee systems, though the qualitative data very clearly highlights the limits of community financial capacity to manage major component costs (>30,000 AFN) regardless of fee structure.

83. **Sufficient: Essential drinking water being supplied but quantities are largely insufficient to meet all basic needs based on national standards due to gradual system degradation and the broader context of drought/climate change.** Water collection rates reported by HHQ respondents suggest that only a minority of users were able to collect sufficient water to meet all household needs based on defined national standards (15 per cent, Table 13).<sup>124</sup> Findings were slightly more positive based on reported daily pumping quantities compared to population figures reported in the O&M questionnaire, where O&M personnel indicated that SWSs could produce enough water per day to provide over a third of the population (37 per cent) with sufficient water to meet household needs potentially indicating system losses from source to

<sup>121</sup> Based on ET analysis of available Apex TPM datasets from December 2023-March 2024 and October 2024. Out of the 45 observations where an agreed amount was specified by the community, values ranged from 0-100 AFS/m3 with the majority of respondents indicating a value of 5-20 AFS/m3 (n=25, 56%), and a sizable proportion (n=16, 36%) reporting paying 0AFS/m3; Average exchange rates (USD to AFS): 2016:≅68 AFS per USD; 2017: ≅68 AFS per USD; 2018: ≅73 AFS per USD; 2019: ≅77 AFS per USD; 2020: ≅77 AFS per USD; 2021: ≅81 AFS per USD (pre-August); ≅90+ AFS per USD (post-August); 2022:≅89 AFS per USD; 2023:≅87 AFS per USD; 2024:≅73 AFS per USD.

<sup>122</sup> UNICEF. (2020). Improved Operation and Maintenance and Revenue Collection from Metered Water Supply Systems: Lessons from Rural Afghanistan. Available at: <https://www.unicef.org/rosa/media/12191/file>.

<sup>123</sup> UNICEF Afghanistan. (2017). Annual WASH Report to Donors-2017. Available at: UNICEF Sharepoint (Internal Document).

<sup>124</sup> Defined as at least 30 L/p/d based on: MRRD, MoPH, and MoE. (2016). National Rural Water, Sanitation and Hygiene (WASH) Policy 2016-2020. 2016. Available at: <https://sar-climate.adpc.net/wp-content/uploads/2022/06/AF-OTH-GD-127.pdf>

pipe. Despite these gaps in meeting all domestic water needs, the fact that the vast majority of users where systems were functional used solar systems as their main source of drinking water (87 per cent) with 59 per cent relying exclusively on the SWS for drinking highlights sufficiency of water for drinking purposes for users. Concerns about water sufficiency were emphasized in the qualitative data as well as available TPM data.<sup>125</sup> Qualitative respondents attributed sufficiency concerns to system degradation (systems are not capable of pumping as much water as they initially could), as well as drought conditions. While use of water for livestock/agricultural purposes was rarely mentioned in the qualitative data, the fact that over a quarter (28 per cent) of users report using water from the solar system for watering livestock could be putting additional strain on systems meant for domestic purposes.

**Table 13 Per cent of users reporting sufficient water for household needs**

Amount collected per day	% of HHQ users (n=545)	% of functional sites visited (n=57)
Survival needs are not being met (<5 L/p/d)	10%	25%
Emergency needs are being met (5-15 L/p/d)	46%	23%
Basic water needs are being met (15-30 L/p/d)	29%	16%
All household needs are being met (>=30 L/p/d) <sup>126</sup>	15%	37%

Source: HHQ. Thresholds based on national standards.

84. **Safe: An assessment of water safety was not possible, though few users presented safety concerns in qualitative or quantitative data.** The safety of water provided through rural water systems could not be verified through planned UNICEF Afghanistan water testing as part of this evaluation exercise. The desk review confirmed an increasing ability of UNICEF Afghanistan to confirm safe water provision from the source with the scale-up of water quality testing resulting in water quality testing in over 90 per cent of projects implemented between 2018 and 2020 through MRRD Ru-WatSIP projects (funded through various streams) and water quality as a standard part of the handover process from 2020.<sup>127</sup> However, desk review confirmed that there were issues in providing safe water with water quality issues sometimes requiring testing and chlorination.<sup>128</sup> Additionally, most of the water systems visited (68 per cent) were observed to be exposed to potential contamination risks due to proximity to latrines, farms, or other pollution sources near the water source and/or taps. Furthermore, a small minority (4 per cent) of SWS users reported concerns that the water quality made people sick. More positively, most O&M questionnaire respondents reported that water quality was tested (63 per cent) with variations in frequency of testing from weekly to ad hoc.

85. **Qualitative and quantitative respondents expressed high levels of satisfaction with systems, emphasizing the importance of water above other needs.** Overall satisfaction with the quality of water and the water system was high with 76 per cent of SWSs users reporting to be 'completely satisfied' with the water systems and 75 per cent 'completely satisfied' with the quality of water provided by the SWSs. These satisfaction rates seem incoherently high with some of the systems described. However, as repeatedly expressed in qualitative data, regardless of limitations in SWS effectiveness, communities were extremely grateful for the support, highlighting the huge impact even minor quantities of water had on their lives.

### Variation in effectiveness

86. **There was notable variation by province in system effectiveness and satisfaction with insufficient water provision across provinces.** Overall, users in Badghis reported substantially worse outcomes, particularly compared to users in Uruzgan. These lower service outcomes were similarly reflected in lower levels of satisfaction among HHQ user respondents in Badghis compared to other provinces, especially Laghman and Uruzgan. The key driver of this variance likely derives from the fact that a higher proportion of users in Badghis were served by older systems (installed by 2021) and systems providing water at the community level.

<sup>125</sup> Out of the 228 TPM observations reviewed, 90 (39%) reported that families were not getting designated quantity of water supply daily, though no more details were provided.

<sup>126</sup> MRRD, MoPH, and MoE. (2016). National Rural Water, Sanitation and Hygiene (WASH) Policy 2016-2020. Available at: <https://sar-climate.adpc.net/wp-content/uploads/2022/06/AF-OTH-GD-127.pdf>

<sup>127</sup> UNICEF Afghanistan. (2021). Final Report: USAID Rural Water Supply, Sanitation and Hygiene (RWS) Grant: SC160225. Available at: UNICEF Sharepoint (Internal document)

<sup>128</sup> UNICEF Afghanistan. (2018). Annual WASH Report to Donors-2018. Available at: UNICEF Sharepoint (Internal document); UNICEF Afghanistan. (2019). Annual WASH Report to Donors-2019. Available at: UNICEF Sharepoint (Internal document); UNICEF Afghanistan. (2020). Annual WASH Report 2020. Available at: UNICEF Sharepoint (Internal document)

**Table 14 Provincial variation in effectiveness criteria based on SWSC indicators in the HHQ**

Criteria	Badghis	Jawzjan	Khost	Laghman	Uruzgan	Total
<b>Alignment with user preferences</b>						
Satisfaction with system	57%	76%	86%	83%	87%	76%
Satisfaction with water quality	56%	77%	82%	82%	88%	75%
Functional						
Accessible						
Available						
Affordable						
Sufficient						

Key: **Dark green**: >75% of respondents reported positively on key SWSC indicator, **Green**: 50-75% of respondents reported positively, **Yellow**: 25-50% reported positive, **Red**: <25% reported positively. The list of indicators and questions used to formulate evaluative judgement is in provided in Annex 6.

87. **Service delivery at household level, identification of designated O&M personnel and establishment of a regular fee/tariff structure appears to support effective service delivery.** UNICEF’s ToC identified these factors as expected to have benefits to service provision effectiveness.<sup>129</sup> Accordingly, the evaluation assessed differences in SWSC indicator achievement disaggregating based on these factors. Results show that, while respondent rating of availability is relatively similar, overall patterns in other criteria show more positive results. For example, users reporting designated O&M personnel were much more likely to report systems as functional based on SWSC indicator definitions. Comparing household versus public tap provision, higher rates of accessibility are clearly tied to water provision at household level. The variation in the proportion of HHQ respondents reporting water was ‘easily affordable’ is less straightforward to interpret.

**Table 15 Service location variation in effectiveness criteria based on SWSC indicators in the HHQ**

SWSC Criteria	Location of service		Designated O&M personnel		Regular fee/tariff structure	
	Household	Public taps	No	Yes	No	Yes
<b>Alignment with user preferences</b>						
Satisfaction with system	80%	62%	44%	78%	74%	76%
Satisfaction with water quality	80%	63%	47%	78%	72%	78%
Functional	33%	32%	12%	33%	25%	36%
Accessible	89%	72%	82%	85%	86%	84%
Available	40%	46%	29%	43%	39%	44%
Affordable	64%	33%	41%	57%	45%	62%

Key: **Dark green**: >75% of respondents reported positively on key SWSC indicator, **Green**: 50-75% of respondents reported positively, **Yellow**: 25-50% reported positive, **Red**: <25% reported positively. The list of indicators and questions used to formulate evaluative judgement is in provided in Annex 6.

**EQ 2.2: To what extent do communities have the financial, material and technical support to maintain the system (including the role of mechanics, local supply chains and tariff systems)?**

88. **The O&M strategy outlines an extremely ambitious ‘ideal scenario’, which communities could only partially fulfil.** Overall, communities demonstrated a clear sense of ownership for functioning systems with demonstrated financial and technical capacity for the regular repairs required to keep systems running. However, the damage and breakage of more expensive parts (especially solar panels and submersible pumps) required technical and financial capacities largely beyond community capacity (Table 16).

**Table 16 Community fulfilment of the ideal O&M scenario per the National O&M Strategy**

<b>Ideal scenario<sup>130</sup> and Evidence of attainment</b>
<b>Partially achieved:</b> Responsibilities for the preventive maintenance as well as for major repair and replacement taken by the community
Approximately half (55 per cent) of visited SWSs had a mechanic assigned responsibility for the system. In qualitative data, community members reported that this maintenance role was often combined with or

<sup>129</sup> For example, based on assumptions that households provided water at the household level would take greater ownership of the system leading to improved willingness to pay as well as quicker identification of functionality issues

<sup>130</sup> Ideal scenario based on the O&M Scorecard. See: Water and Sanitation Group, Ru-WatSIP, and MRRD. (2019). Afghanistan Rural Water Supply Operation & Maintenance (O&M) Strategy 2020-2030. Available at: UNICEF Sharepoint (not publicly available)

complemented by a caretaker/guard role who held responsibility for turning the system on and off and guarding against theft and damage from children. Community members themselves also played a role in most communities, taking responsibility for identifying and reporting issues. Qualitative respondents reported that the village-level personnel were primarily responsible for minor repairs and preventative maintenance, particularly monitoring of system components to prevent damage. However, despite generally strong ownership of the systems, qualitative respondents highlighted that they did not have the financial or technical capacity to take responsibility for major repairs. Specifically, minor repairs that communities could address included pipe damage and leaks, tap replacement, basic cleaning and filter maintenance, valve replacement, and minor electrical issues (where local mechanics had relevant skills). These repairs typically required readily available materials from local bazaars and could be managed with existing community technical capacity and financial resources, though ad hoc fee collection was often necessary. In contrast, major component failures consistently exceeded local capacity, requiring external technical and financial intervention. These included: submersible pump repair or replacement, solar panel damage or degradation, inverter malfunction, electrical controller issues, and structural problems with reservoirs or water sources. Mechanics, WUC members, and community stakeholders consistently reported that these major repairs required specialized technical expertise unavailable locally, components only available at district or provincial centres, and costs beyond community financial capacity even with additional contributions from households. Skill gaps were also reported in the O&M questionnaire where more than half of respondents reported that technical skills were either not available for all needed repairs (32 per cent) or not available at all (32 per cent). Communities were not equipped with the necessary tools and spare parts for future repairs, and external actors (PRRD, UNICEF, etc.) were not always able to address these gaps in supporting communities.

**Limited achievement:** Tariff collected from the beneficiaries for the remuneration of mechanic, spare parts and balance beforehand

While most of qualitative respondents and HHQ SWS users (66 per cent) reported some system of regular tariffs paid, these tariffs were necessarily low to enable community affordability. As a result, in qualitative data, respondents reported ad hoc fee collection primarily to finance repairs in addition to or in place of regular fees. This was triangulated in the O&M data where most respondents said that fees were either not sufficient to pay for either major or minor repairs (49 per cent) or only sufficient to pay for minor repairs (37 per cent) as well as the HHQ where most users had paid additional funds when systems needed repair (74 per cent of users where systems had required repair). O&M respondents reported considerable variation in the average operational costs for SWSs, with an average annual cost of 966 AFN per household (USD 14.50). However, these cost estimations ranged considerably, from approximately AFN 4,000 (USD 62) to AFN50 (USD 0.60). The accuracy of these figures is somewhat questionable given that only half of the O&M systems had a verified O&M plan (35 of 73) and very few (8 of 73) sites visited kept a record of revenues and expenditures.

In KIs with the mechanics, most received some form of payment (daily fee or salary). However, payment for mechanics remained a substantial barrier with half of O&M questionnaire respondents reporting that skills were not always available due to insufficient money to pay someone for the repair highlighting gaps in sufficiency of collected fees (either regular or ad hoc) for paying mechanics, especially for those repairs requiring higher levels of expertise. This may be because, as explained above, local 'mechanics' often have limited skills requiring communities to bring skilled individuals from the bazaar for a higher fee. Reported savings after covering O&M costs were very infrequently reported either in quantitative data (reported in 12 per cent of visited systems, n=9) or in qualitative data. For most systems, qualitative respondents and the O&M questionnaire respondents reported no savings. Qualitative respondents instead highlighted the economic destitution of communities, lacking resources for even the most basic needs (including food). The lack of funds for repairs had a notable effect on system functionality. Insufficient funds for repairs were among the top two reasons that HHQ SWS users reported as causing systems to become non-functional (the other being lack of water).

**Partially achieved:** Most of the spare parts frequently required available (or a stock is maintained) at the village level itself

Mechanics and WUC members reported that spare parts for minor fixes (pipes, taps) were generally available in local bazaars but parts for major component repairs (submersible pump, solar panels, inverters) required travelling to district or provincial centres with multiple days required for travel. In the HHQ, the lack of parts to fix the system was reported as a reason for non-functionality among a minority of respondents in communities where systems did not function (19 per cent). Maintaining a stock of spare parts was not reported by any qualitative respondent, only one woman reported an initial stock provided by the implementing organization.

**Mostly achieved:** Preventive maintenance (if not major repair) carried out at the community level itself

In qualitative data, most stakeholders affirmed community capacity to carry out minor maintenance relying on local maintenance worker capacity. Community stakeholders provided numerous examples of their ability to address the regularly occurring breakages/damage to taps and pipes as well as cleaning of the system. Reported maintenance worker capacity for minor repairs (pipe leakages, replacing valves, replacing faulty handpump) was generally consistent despite approximately half of community-level respondents stating that no specific training had been provided for local maintenance staff. Capacity for more technical repairs was more limited with most interviewed mechanics reporting needed external support for repairs involving the submersible pumps, inverters, electrical issues or the solar panels. UNICEF Afghanistan extenders and (I)NGO AI interview respondents echoed concerns about

insufficient technical expertise for O&M at the community level. Qualitative respondents highlighted the importance of community support for repairs. This was similarly reported in the HHQ, where most users (62 per cent) reported some knowledge of how to perform basic maintenance (for example cleaning a filter or tightening a loose tap). Importantly, the O&M strategy envisioned de-facto PRRD/MRRD support in cases of 'significant problems and repairs'. Most men, WUC and mechanics in qualitative data were positive about their ability to contact external support providers (de-facto D/PRRD, UNICEF Afghanistan or other INGOs, private companies) but were less confident that they would receive the needed support from these actors on time or at all.

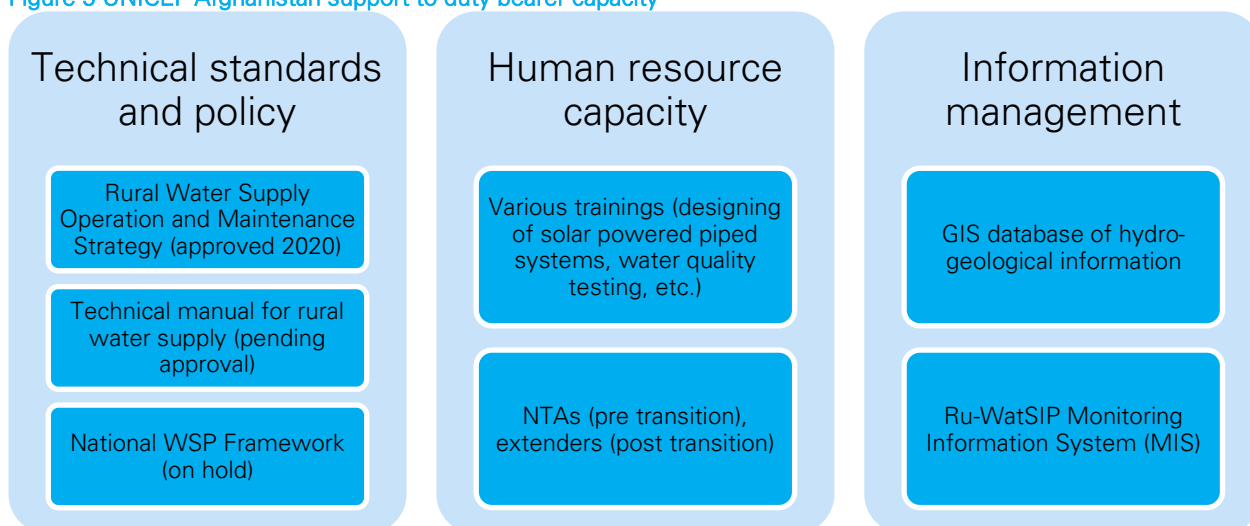
Source: compiled based on primary and secondary data

### EQ 2.3: To what extent was the quality of design and execution sufficient to enable system operation? (including climate resilience/durability of systems)

89. **UNICEF Afghanistan support was essential to bridge continued capacity gaps for design and execution within the MRRD before the political transition.** UNICEF Afghanistan has aided in the bridging of gaps in technical standards, human resource capacities and information management to bolster capacity for design and implementation (Figure 5). This support has resulted in observable changes in duty bearer capacity for quality design, including adoption of water quality testing as a standard requirement to be completed at least once before project commissioning. UNICEF Afghanistan stakeholders were positive about the importance of the aforementioned technical standards in raising design requirements. However, some UNICEF Afghanistan and (de facto) DRRD interviewees questioned whether implementers have the capacity to meet these standards. There is limited ability to triangulate these findings with secondary data as TPM data is not sufficiently structured to understand whether standards were executed as intended.<sup>131</sup>

90. **Responding to capacity gaps is more difficult following the political transition.** The extender modality enabled UNICEF Afghanistan to maintain coordination with the de facto MRRD and its provincial/district counterparts. However, the indirect modality required by ongoing sanctions entails a difficult balance of working through third party implementers, intermediary coordination mechanisms, avoiding direct budget support, and maintaining duly distanced relationship with the de facto ministries while still requiring permissions/authorizations. This ultimately reduces the efficiency and effectiveness of support.<sup>132, 133</sup> The need for continued strengthening of national and sub-national systems for planning, implementing, and monitoring WASH programmes is evidenced by the inclusion of continued capacity development plans for the rural water supply programme in all annual reports to donors for the evaluation period.

Figure 5 UNICEF Afghanistan support to duty bearer capacity



Source: Document review and KIIs with UNICEF Afghanistan staff

91. **UNICEF Afghanistan's engagement of TPM's enhanced execution, though recurrent issues remained.** Interviewed UNICEF Afghanistan stakeholders were unanimously positive about the importance of TPMs to enhance UNICEF Afghanistan and (de facto) M/PRRD oversight during construction. TPMs were

<sup>131</sup> For example, while available TPM data shows that some standards were not included in the BoQ (such as leakage tests, air pressure tests and disinfection tests for new construction sites), the absence of a test on a BoQ does not mean the test was never completed.

<sup>132</sup> Shimada, Haruyuki. (2025). Aid Paradox for Unrecognized Governments: The Taliban and Aid. Available at: <https://doi.org/10.1111/dpr.70008>.

<sup>133</sup> United Nations Security Council. (2023). Report of the independent assessment pursuant to Security Council resolution 2679 (2023). Available at: <https://docs.un.org/en/S/2023/856>

essential for identifying and rectifying issues during construction, despite some concerns about TPM capacity. Review of available TPM datasets from Apex suggest that design and execution generally adhered to designs and specifications (50 per cent, n=143) or had only “minor” issues (34 per cent, n=99). Available TPM datasets classified issues as “critical” or “major” for only 16 per cent (n=46) of the 288 observations reviewed. In reviewed TPM summary reporting, there are recurrent construction issues identified, though it is not always clear whether these applied to solar systems in particular. Notably, the Apex report covering SWSs (among other interventions) implemented between 2023 and February 2025 notes safety concerns, improper construction practices, missing project documentation and deviations from technical specifications as “significant quality issues that persisted across WASH infrastructure sites”.<sup>134</sup> However, as discussed in EQ6.2, TPM data is not in a format that enables clear identification of primary issues.

92. **Established controls to safeguard the quality of key components were essential to proper execution, though gaps remain.** All designs have to be approved by ministry engineers and certain key components including the submersible pump require approval based on submitted serial numbers for verification that they are from approved suppliers. However, AI interview respondents also highlighted the negative impact of sanctions against the DfA, which has restricted access to some high-quality products. Multiple AI interviews noted de facto MRRD approval of low-quality solar panels as having a detrimental effect on design quality. Inclusion of a warranty requirement for other key parts was a requirement to ensure support in case of functionality issues. The effectiveness of the warranty system in practice was questioned by a de facto DRRD and UNICEF Afghanistan stakeholders. These limitations were also reflected by one mechanic’s testimony who highlighted that, despite parts being under warranty, the company responsible still charged labour fees for an engineer to address the problems. The absence of references to the warranty system by other community stakeholders as a coping mechanism for system failure may reflect gaps in awareness of its existence or use considering that the O&M data shows parts are being replaced within expected warranty periods.<sup>135</sup>

93. **Consistent functionality issues indicate that design and execution could be improved within the areas of observation.** Of the 74 sites visited, O&M questionnaire respondents reported 75 per cent functionality, with systems as fully functional in approximately a third of visited sites (31 per cent) and functional with some issues (44 per cent). Importantly, this evaluation was not an engineering assessment, and these judgements are based on SWS operators’ overall views based on systems working “as designed” or “as expected”. Furthermore, as neither UNICEF Afghanistan nor the de facto MRRD implements any systematic monitoring of functionality, these observations cannot be triangulated with secondary data. The primary data collection indicated defects in major hardware components, especially solar panels (Table 17).

**Table 17 Reported functionality issues for key components in the SWS**

Hardware component	% not functioning as intended <sup>136</sup>	Primary issues identified
Pipe network	45%	Issues with the pipe network were almost universally reported in qualitative data with damage to pipes causing water loss through leaks and service interruptions for repairs. In the O&M questionnaire the main issues reported were similarly broken pipes and broken taps.
Pump	41%	Community stakeholders across provinces identified problems with the submersible pump causing lower functionality or complete system failures. Qualitative respondents and the O&M questionnaire attributed these issues primarily to lowering water table and insufficient pumping capacity to meet community needs. Notably, in the qualitative data mechanics specified that the pumping capacity had decreased over time, though they were not sure if this was due to pump degradation or the lowering water table.
Solar panels	52%	Community stakeholders across provinces highlighted issues with solar panel degradation and failure after 3-4 years of operation reducing system functionality in terms of hours/day of pumping capacity and the systems’ ability to extract water. Solar panel breakage and insufficient power were the main functionality concerns reported in the O&M questionnaire. The issue of low-quality solar panels was also highlighted by multiple stakeholders in the AI interview. Finally,

<sup>134</sup> Apex Consulting. (2025). Third Party Monitoring WASH Services Fiscal Year 2024 End of Project Report. Available at: UNICEF Sharepoint (Internal Document)

<sup>135</sup> According to (de facto) DRRD interviews, in the North and South the DRRD relies on solar panels with a 25-year warranty period. The interview with the North DRRD also mentioned relying on pumps with a 3-year warranty period (not specified by the DRRD interviewee from the South). An interview with an (I)NGO in the Central region confirms these warranty periods.

<sup>136</sup> Based on the O&M Questionnaire.

		as highlighted in community-level data and the AI interview, human damage to solar panels (especially children throwing rocks) was a specific concern mentioned that did not have to do with the design quality.
Water storage (reservoir or tank)	32%	Reservoir damage was less frequently reported in qualitative data. In the O&M questionnaire, most respondents reporting functionality issues with water storage attributed this to leaks. Leaks were similarly reported within the available TPM datasets (28%, n=69 observations).

Source: O&M questionnaire (%). Observations based on O&M data and qualitative data collection.

94. **TPM data is not sufficiently structured to enable understanding of the final design and execution quality.** While individual reports may signal whether all issues were resolved before completion, and this was supposed to be confirmed during the handover process (see EQ3.3), the disaggregation of information into site-specific reports, stored individually on ActivityInfo, prevents understanding of the overall quality of design or any primary issues in design quality. Furthermore, though some available final TPM reports highlight issues of non-compliance with the design, Bill of Quantities (BoQ) or contract terms, the reports do not provide good understanding of the eventual impact (if any) of these deviations on project functioning (deviations from design being a natural part of the construction process).<sup>137</sup> Finally, the absence of available BoQs and designs at sites during TPM visits was a common issue limiting TPM accuracy in Apex’s final report covering September 2023-February 2025.

95. **Replacement of solar panels and pumps in some systems was occurring before their expected lifespan while other systems reported no major replacements in nearly a decade.** According to the National O&M Plan, solar panels should last 20-30 years and pumps should last 3-5 years when systems are “well laid out”.<sup>138</sup> Based on this standard, some systems appear to have design quality defects as 22 per cent of visited systems had replaced at least some of their solar panels (with the oldest system visited having been completed in 2016, i.e. <10 years ago). Additionally, of the 24 visited systems where operators reported replacing the pump, 9 of these systems were completed in 2022 or later (i.e., <3 years old). In contrast, a third of systems visited reported no replacements with these systems completed as early as 2016.

96. **Durability and safety of systems may be affected by environmental and human risks.** Risks from human and animal damage were limited in the physical observations with most visited systems observed to be fenced (80 per cent) and protected from human damage (82 per cent). This was similar to findings in available TPM datasets where most sites were enclosed to protect solar panels from human or animal disturbance. However, contamination risks were more frequently reported, with most observed systems at risk of contamination to either their source or taps due to proximity to farms, latrines or other pollutants (68 per cent). Issues in site selection, including contamination risks, were also highlighted in the DACAAR final TPM report covering 2017-219 as a consistent issue, though the extent to which contamination risks specifically posed a threat is unclear.<sup>139</sup>

97. **Primary data shows variable vulnerability of SWS to impacts of climate change/natural disasters.** The physical observation noted issues with site conditions at the water supply site such as flood exposure in 12 per cent of sites visited. Data from the O&M interviews indicate gaps in system robustness to environmental exposure: 45 per cent of respondents reported that the functioning of water source/catchment area had been affected by extreme events, such as floods or droughts and 53 per cent reported the same for the water point(s). Site-specific vulnerabilities were also highlighted in the AI interview, with participants noting both efforts to reduce climate vulnerability (such as elevating reservoirs and burying pipes), as well as the continued vulnerability of some sites. While only 4 per cent of HHQ users reported that water is less available due to drought, qualitative respondents repeatedly emphasized how lowering groundwater levels had reduced the sufficiency of water provided. Vulnerability to climate impacts was not clearly assessed in TPM data with limited data relevant points available. Most notably, the depth of wells differed from design in some instances, both deeper and shallower than designed. While variations are an expected and necessary part of physical installations, shallower wells (ranging from a few meters to over 100 meters shallower than designed) may have reduced the climate resilience of some sites. In the available TPM dataset, the vast majority of visits reported that panels were anchored firmly enough to withstand weather impacts. Other

<sup>137</sup> Deviations from BoQs/designs were noted in DACAAR. (2020). Final Report: Technical Support to Rural Water Supply Programs (Project Period: September 2017 – December 2019.). Available at: UNICEF Sharepoint (Internal document)

<sup>138</sup> As stated in the footnote above, interviewed (de facto) DRRD representatives confirmed that approved suppliers complied with these expected timelines from the O&M Plan.

<sup>139</sup> DACAAR. (2020). Final Report: Technical Support to Rural Water Supply Programs (Project Period: September 2017 – December 2019.). Available at: UNICEF Sharepoint (Internal document)

questions used in the TPM were not easily interpreted with regard to climate resilience. For example, the form asks if public taps were exposed to hazards generally but did not specify what types of hazards this encompasses. Not all reservoirs were elevated but, because it is not indicated whether the area is flood prone, it is not possible to interpret this information.<sup>140</sup>

98. **The increasing utilisation of solar power in Afghanistan has increased the availability of quality construction and replacement parts, though major market disruptions posed specific constraints.** UNICEF Afghanistan stakeholders were positive about the current availability of quality materials, although documentation highlighted specific issues related to material availability during shocks, especially the immediate aftermath of the political transition.

#### **EQ 2.4: What are any other key challenges/enablers emerging from the data collection affecting the operation of water systems?**

99. **Delayed or inadequate responses from partners and authorities undermine system functionality.** Community stakeholders were generally positive about their capacity to raise needs to implementing partners and UNICEF Afghanistan. However, delayed or insufficient responses from these actors undermined system functionality. These gaps in capacities of external stakeholders to respond effectively to communities were acknowledged by UNICEF Afghanistan and de-facto PRRD stakeholders.

100. **Cloudy and rainy weather had a significantly negative impact on system functionality, with communities going between two and ten days without water from the SWs during these periods.** In qualitative data, respondents across stakeholder type highlighted the weather dependency of system functionality. Seasonal variations also affected availability, with 44 per cent of households reporting reduced water availability in winter due to shorter daylight hours and 32 per cent reporting reduced availability in summer due to drier conditions. In qualitative data, respondents from the east and northern zones were more likely to report these issues without differences by gender of respondent. Respondents highlighted the importance of water storage to compensate for limited hours of operation due to rationing and limited hours of sunlight per day. However, communities have no backups during the longer outages due to clouds and rain, forcing communities to seek alternative sources of water.

### **5.3 Sustainability**

#### **To what extent are solar-powered and piped water supply systems in Afghanistan sustainable?**

**Key findings:** Most systems visited were providing water (75 per cent: 31 per cent fully functional, 44 per cent providing water with some issues). However, older solar water systems (completed by 2021) showed clear degradation, with far worse performance and higher failure rates. Communities showed strong ownership (86 per cent of users felt they could “definitely” maintain the system; 80 per cent willing to contribute more in money or labour if needed) and could manage minor repairs but lacked the technical and financial capacity for major component failures. Climate-resilience measures, risk assessments, establishment of WSPs (~60 per cent of all systems) were increasingly used, but gaps persisted in hydrogeological surveys, reservoir capacity (only 33 per cent adequate), and drought vulnerability. Handover processes were inconsistently applied across partners and contexts, with variable training, quality checks, and committee formation. Governance structures (CDCs/WUCs) remained non-standardized with limited women's participation. Reliance on ad-hoc fee collection was insufficient for long-term sustainability and major repairs.

#### **EQ3.1 To what extent do solar powered and piped water supply systems providing/expected to provide sustained access?**

101. **While most of the systems visited are still functional and providing water, with 75 per cent either fully functional (31 per cent) or functional with some issues (44 per cent), community-level data indicates major system degradation after four or five years.** Except for sufficiency (where values were very similar) older systems (completed by 2021) performed consistently worse on SWSC effectiveness indicators compared to newer systems. Older systems were also, unsurprisingly, more likely to be completely non-functional (41 per cent, n=11 of sites completed by 2021 compared to 13 per cent, n=6 of sites completed post 2021). These patterns were echoed in qualitative data with respondents in communities with older systems more likely to report major system degradation resulting in lower quality services.

<sup>140</sup> Ibid.

**Table 18 Comparison of SWSC indicators in the HHQ by year of completion**

Effectiveness indicators <sup>141</sup>	Completed by 2021 (2016-2021)	post 2021 (2022-2024)
Functional (always worked)	23%	35%
Accessible (u30 minutes)	79%	87%
Available (open/available when needed)	31 %	46%
Affordable (easily affordable)	43% overall (60% of those paying regular fees)	60% overall (64% of those paying regular fees)
Sufficient (provides at least emergency quantities)	15%	15%

Source: HHQ.

102. **Communities did not have the technical or financial capacity to overcome major system breakdowns without external support.** As discussed in EQ2.2, communities could respond and repair more minor issues. However, major issues often resulted in complete system failure unless there was external intervention. Notably, qualitative data highlighted some communities capable of overcoming major breakdowns. However, these respondents noted that replacement parts (for both major and minor damage) often resulted in reduced functionality over time.

103. **Major component repairs (and the inability to fund these repairs) and declining water availability are the main causes of complete system failures.** In the O&M questionnaire, 23 per cent of sites had broken down completely and were no longer providing any water. In the HHQ, community members not using any water from the solar system were asked if they knew why the system had broken. Most attributed system failures to a lack of money to fix the system (37 per cent of community members reporting non-functional systems) or because there was no water in the borehole (35 per cent). These findings were triangulated by qualitative data where respondents highlighted a financial inability to respond to major component failure especially related to the tank/reservoir, solar panel and submersible pump/motor. These issues were similarly reported in the O&M Questionnaire where, among the 17 non-functioning systems observed, most had issues with the pump (14 of 17), solar panels (13 of 17) and reservoir (11 of 17).

104. **Despite these vulnerabilities, most SWS users expressed strong confidence in system sustainability.** Among participating households, 86 per cent reported that they would 'definitely' be able to maintain the water systems, while 80 per cent indicated willingness to pay more or contribute more (in money or labour) to improve or sustain the water service. This high level of positivity in quantitative data echoes the commitments repeatedly expressed in qualitative data. Regardless of the difficulties, community members confirmed their commitment to maintain the systems, repeatedly affirming the vital importance of these systems.

### **EQ3.2 How resilient are these solar-powered systems to climate-related challenges, such as droughts, floods, and extreme weather conditions?**

105. **UNICEF Afghanistan increasingly incorporated considerations to enable SWS installations to meet the definition of climate resilient water services.** There is no sector-wide agreement on how to define climate resilient WASH services.<sup>142</sup> Based on UNICEF Afghanistan's definition of climate resilient water services developed in 2019, UNICEF Afghanistan's SWS considered climate resilient criteria to an increasing extent (Table 19).<sup>143</sup>

**Table 19 Extent to which solar powered rural water systems meet criteria of climate resilient water service**

Criteria and water system fulfilment
Mostly achieved: Risk analysis undertaken

<sup>141</sup> Effectiveness indicators are based on UNICEF SWSC guidance. See Annex 6 for further details.

<sup>142</sup> There is ongoing work by the JMP and GLAAS teams to identify indicators for monitoring climate resilient WASH at the global level. University of Leeds. (2025). Indicators, Measures and Methods for Monitoring Climate Resilient WASH – Discussion Paper. Available at: <https://washdata.org/reports/jmp-glaas-2025-monitoring-climate-resilient-wash-discussion-paper>.

<sup>143</sup> There is no sector-wide agreement on how to define climate resilient WASH services. Selected criteria are based on the definition of climate resilient water services as presented in: UNICEF and Global Water Partnership. (2022). WASH Climate Resilient Development Strategic Framework. Available at: <https://www.unicef.org/indonesia/media/23816/file/framework-strengthening-wash-climate-resilience.pdf>

UNICEF Afghanistan recognized the importance of site-specific groundwater investigation<sup>144</sup> and UNICEF Afghanistan staff, IPs and extenders confirmed that these site-specific environmental assessments were regularly done in line with national policies. Challenges related to hydrogeological assessments were noted in the 2016 annual report to donors; the absence of this challenge in subsequent reports may indicate improvements in practice.<sup>145</sup> Available donor reporting is not clear on the extent to which these assessments were planned or conducted, and it is not possible to review all project documents to confirm these assessments were planned/conducted. However, based on a random selection of 13 design documents from the MRRD Monitoring Information System (MIS), well drilling was always included within the BoQs signifying a necessary first step for appropriate risk analysis.<sup>146</sup> More recently, UNICEF Afghanistan, together with SIWI conducted a Climate Risk Analysis for WASH Services in Afghanistan published in 2025.<sup>147</sup>

Despite considerations, some gaps were observed in primary and secondary data. For example, TPM identification of the need to conduct hydrogeological surveys to prevent borewell failures as a lesson learnt for interventions in Fiscal Year 2024 suggests that risk analysis was not always undertaken (though it is not clear whether this lesson learnt applies to solar systems specifically).<sup>148</sup> These gaps are triangulated at community level as only a minority of O&M respondents reported either a hydrological or environmental assessments before installation (39 per cent of O&M respondents), though weaknesses in recall accuracy and stakeholders knowledge of more technical components of assessments are acknowledged.

#### **Partially achieved: Preventative measures included (increasing focus)**

The UNICEF ACO piloted the inclusion of WSP development alongside rural water supply projects in 2017 supported by USAID funding which included the development of a “climate-resilient water safety plan” within associated O&M trainings.<sup>149</sup> Though the exact number of WSP’s differs between UNICEF Afghanistan reporting sources, sometimes dramatically, all show a general increase in the number of water systems where a WSP was developed from 2016.<sup>150</sup> Overall, ActivityInfo indicates that WSP’s have been established for approximately 60 per cent of SWSs. O&M questionnaire data compares similarly with ActivityInfo data, with 53 per cent of O&M respondents reporting that a WSP was developed and implemented for their SWS and an additional 12 per cent reporting the WSP was developed but not implemented. UNICEF Afghanistan staff, IPs and extenders highlighted these efforts as ongoing emphasizing their effectiveness in improving system sustainability. While it was not feasible to assess WSP effectiveness/impact in detail, the fact that O&M respondents were less likely to report water sources or water points being affected by extreme events in SWS where WSPs had been developed is a positive indication,<sup>151</sup> as is UNICEF Afghanistan’s internal learning on WSP implementation, which provided a positive review of effectiveness based on a rapid assessment of implementation in two locations.

Reservoir size appears insufficient for the majority of SWS observed with one third of systems (33 per cent) reported to have sufficient capacity to provide the identified service population with sufficient water for approximately one day.<sup>152</sup> According to UNICEF feedback, this reflects a deliberate design decision to reduce costs rather than inadequate planning. A UNICEF stakeholder reported that the programme design encouraged household-level water storage (tanks) as an additional buffer for dry spells and system downtime in an effort to improve cost-

<sup>144</sup> UNICEF ROSA. (2021). Climate Resilient WASH-Afghanistan. Available at: UNICEF Sharepoint (Internal Document)

<sup>145</sup> UNICEF Afghanistan. (2016). Annual WASH Report to Donors-2016. Available at: UNICEF Sharepoint (Internal Document)

<sup>146</sup> The ET cannot make any further conclusions as the random sample of 13 BoQs accounts for a small fraction of those stored in the MIS system. These system level documents are stored in PDF without the ability to search through them easily. Importantly, BoQs were only available for some solar interventions in 2024, limiting the value of this data source. Additionally, without the ability to compare the test results with what pump was eventually installed, it is not feasible to determine whether eventual installation accounted for these test results appropriately.

<sup>147</sup> UNICEF and Stockholm International Water Institute (SIWI). (2025). Climate Risk Analysis for the Water, Sanitation and Hygiene Sector in Afghanistan. Available at: <https://knowledge.unicef.org/wash/resource/climate-risk-analysis-water-sanitation-and-hygiene-sector-afghanistan>.

<sup>148</sup> Apex Consulting. (2025). Third Party Monitoring WASH Services Fiscal Year 2024 End of Project Report. Available at: UNICEF Sharepoint (Internal document). Within available datasets, pump tests were not always undertaken for new constructions, though it is unclear whether this indicates they never would be undertaken or only had not been undertaken at that point in time.

<sup>149</sup> USAID. (n.d.). Program Contribution Agreement AID-306-IO-16-00002. Available at: UNICEF Sharepoint (Internal document)

<sup>150</sup> ET analysis of documentation and UNICEF Afghanistan. UNICEF Afghanistan. (2025). ActivityInfo “Water Supply” Datasets. Available at: UNICEF ActivityInfo Database (Accessed 6 November 2025). Data quality issues were acknowledged by UNICEF for UNICEF Afghanistan. (n.d.). Water Supply: 2016-2021. Available at: <https://www.activityinfo.org/app#database/cngjzx9l7puu83e2> (Access required). Discrepancies between data sources were not directly explored. These discrepancies may be due to different temporal accounting factors for when WSP establishment is specified.

<sup>151</sup> The differences are marginal and the sample size is too small to determine any significance of these differences. In SWS where WSPs had been developed, 41% of O&M respondents reported that their system had been impacted by extreme events. This compared to 54% of O&M respondents in SWS where no WSP had been developed.

<sup>152</sup> Determination of sufficient reservoir capacity was estimated based on the formulation of a binary variable to determine whether the reported reservoir size was large enough to provide the identified service population and a minimum per capita water demand of 15 L/person/day, adjusted by a 1.2 growth factor to account for approximately 2 percent annual population growth over a 10-year horizon. This provides storage equivalent to roughly one day of demand, accommodating limited daily pumping hours (typically 6–8 hours) and reflecting common water collection patterns.

effectiveness by distributing storage capacity across households. Qualitative data confirms storage enabled households to compensate for the limited hours of water provided per day, even if storage could not extend community buffering capacity for longer service outages of multiple days (especially related to regular breakdowns as well as rainy/cloudy weather).

As discussed in EQ2, evidence suggests that, despite preventative measures being considered, specific sites remain vulnerable to climate change/natural disasters. Additionally, the broader climate of drought was found to be a factor contributing to reduced effectiveness of systems, suggesting limited climate resilience.

**Fully achieved:** Considered the impact of the system in terms of greenhouse emissions (GHE) and use renewable energy sources:

All systems rely on solar energy.

**Limited achievement:** Robust management models to cope with crisis

Primary data shows that management models demonstrate strong response capacity for short-term acute service needs, such as coordinating and mobilizing community efforts to respond to breakdowns (contacting external actors for support, mobilizing funds for repairs) and conflict resolution skills to mitigate or prevent disputes (site locations during design and conflicts over payment). However, the dominant financial model (ad-hoc collection/no or low regular water tariff) is fundamentally inadequate for longer-term sustainability requirements. As a result, local management models cannot afford major repairs when they inevitably occur, and external stakeholders (M/P/DRRD, UNICEF Afghanistan) have limited response capacities in terms of funding or staff to respond to all service needs.

Source: ET based on evaluation findings

### 106. **Broader issues in water management, including the lack of reliable data and weaknesses in water governance, are constraining factors to sustain investments acknowledged in primary and secondary data.**<sup>153,</sup>

<sup>154, 155</sup> UNICEF Afghanistan has supported the climate resilience of water systems more broadly through investments in systems and capacities supporting groundwater monitoring, WSP implementation, and integrated water resource management (IWRM).<sup>156</sup> UNICEF Afghanistan is also part of the Afghanistan Water Platform (AWAP), which aims improve coordination and data use to maximize the benefits and impact of water-related development and humanitarian assistance.<sup>157</sup> Assessing the effectiveness of these efforts are outside this evaluation's scope. However, notable outputs, such as UNICEF Afghanistan's support for the national consultation workshop on IWRM and bringing together essential stakeholders for a water sector roadmap development, are fundamental building blocks to increase the climate resilience of the sector.

### **EQ 3.3: What was the process of handing over the solar-powered water projects to CDCs and the communities, and how did this transition take place?**

107. The process of system handover was intended to ensure installation quality and provide an official transition of ownership to community actors. Reporting describes this process very generically as consisting of an inspection of the project comprising district, provincial and MRRD staff culminating in a joint signature of handover documents to the CDC. A short report is prepared with the details of the water system, to be kept at the MRRD with the information entered into the MIS system.<sup>158</sup> Capacity building and material support for water testing capacity has resulted in the inclusion of water testing as a mandatory requirement before handover to communities. Additionally, communities were expected to receive skills training and tools necessary for ongoing maintenance, with a formal committee structure established that includes community leaders, cashiers for fee collection, and trained mechanics or guards responsible for day-to-day operations. This is similarly not documented in detail but presented in the Rural Water Supply, Sanitation and Hygiene (RWS) 1 proposal which specifies that "CDCs will be supplied with and trained in using Standard Operating Procedures for managing the community water supplies."<sup>159</sup> This detail is not mentioned in other reports,

<sup>153</sup> UNICEF Afghanistan. (2023). National Consultation Workshop Report. Available at: UNICEF Sharepoint (Internal document)

<sup>154</sup> UNICEF. (2025). Climate Risk Analysis for the Water, Sanitation and Hygiene Sector in Afghanistan. Available at: <https://knowledge.unicef.org/wash/resource/climate-risk-analysis-water-sanitation-and-hygiene-sector-afghanistan>

<sup>155</sup> Peterson, Georg. (2024). Integrated Water Resources Management Roadmap: Afghanistan. Available at: UNICEF Sharepoint (Internal document)

<sup>156</sup> Prior to the political transition, UNICEF supported government departments to hire technical experts to support and strengthen the WASH sector in Afghanistan through the NTA policy with the expectation that these positions would be gradually absorbed by the government civil servant structure.

<sup>157</sup> UNAMA. (2023). United Nations Afghanistan Annual Report 2023. Available at: [https://unama.unmissions.org/sites/default/files/unsdg\\_afghanistan\\_report\\_2023\\_final.pdf](https://unama.unmissions.org/sites/default/files/unsdg_afghanistan_report_2023_final.pdf)

<sup>158</sup> This is the process described in the 2016, 2017 and 2018 Annual Reports to Donors.

<sup>159</sup> This refers to RWS1 (USAID RWS Grant). Under RWS1, responsibility for post-construction management of water systems is described with a degree of institutional flexibility: The UNICEF Afghanistan Final Report (2021) specifies that handed-over systems had "a sub-water committee taking responsibility for the management of these systems." This indicates that, in practice, management functions were often delegated to sub-committees operating under broader community governance structures, rather than being vested exclusively in CDCs. Earlier RWS1 proposal documentation states that CDCs would be supplied with and trained in

though the final report to USAID for RWS1 and the proposal for RWS2 both mention CDC responsibility for management.<sup>160</sup>

108. **UNICEF Afghanistan stakeholders confirmed that the handover process was not implemented consistently.** The experience of this handover process varied according to many factors including implementing partner, implementation context (emergency versus development funding), community capacity and internal cohesion. In qualitative data, WUC members provided descriptions of the handover process. WUC members described meetings, installation of pipes, activation of the water pumps, and then selection of mechanics. However, some of the mechanics selected highlight that they had not received any trainings thus far. Notably, there was some inconsistency in reported procedures, with extenders indicating in the AI interview that WUCs are established following handover of the SWS, whereas WASH officers stated in interviews that handover occurs only once the WUC is established.

109. **UNICEF Afghanistan stakeholders reported a significant transformation in climate-resilient WASH planning from ad hoc, project-by-project approaches to more systematic, community-based climate resilience planning integrated into all water supply interventions.** In discussing adaptations to the implementation model, UNICEF Afghanistan interviewees described how the "climate resilience WASH planning" approach had gradually transformed from a more variable project-specific approach to something more systematic whereby all communities where SWSs are installed develop comprehensive O&M plans including cost recovery calculations, formal agreements on roles and responsibilities, linkages to suppliers for spare parts, and accountability mechanisms for transparent financial management. This transformation was driven by contextual changes (groundwater depletion concerns), funding opportunities (Islamic Development Bank grant required a more systematic approach) and institutional learning and commitments (global climate commitments, understanding of systems failures). UNICEF stakeholders characterized the process as ongoing, with continued scope for refinement and improvement. The extent to which this process is standardised across Zonal offices was not clear to the evaluation team as few zonal officers provided the requested community consultation materials preventing comparison; there were differences between reviewed materials.

#### **EQ 3.4: To what extent does community management and governance functionality, modality of operation and transparency support or challenge system operation and sustainability? (findings disaggregated by type of function i.e. CDC, WUC as relevant, including the role of women)**

110. This EQ relies almost exclusively on primary data as there is no systematically stored information about water governance structures for the period under evaluation. It is important to note that the unexpected dissolution of CDCs in May 2024 represented a significant contextual change, undermining the assumptions of the SWS ToC, which anticipated that SWS governance would be integrated within CDCs.<sup>161</sup>

111. **Local governance structures were not standardized during rural water supply system implementation, resulting in varied community-level formulations in which women generally did not feature.** Quality and capacity varied substantially between communities, with some bringing valuable local initiatives while others struggled with technical capacity despite support from (de facto) PRRD and technical extenders. Such variations in governance structures also led to the emergence of critical challenges, for instance when CDCs from outside communities were contracted to implement projects in villages without established CDC

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Standard Operating Procedures for managing community water supplies, suggesting an intended formalised management role. However, the final reporting language reflects adaptation at implementation level, with sub-water committees assuming day-to-day management responsibilities. Taken together, RWS1 establishes community-based management as the core principle but allows for variation in the specific entity (CDC vs sub-water committee) responsible for system management at handover. See: UNICEF Afghanistan. (n.d.). Addressing the Water Supply Needs of Afghanistan's Most Vulnerable Communities with High Stunting and Open Defecation Prevalence: Final Draft Proposal. Available at: UNICEF Sharepoint (Internal document)

<sup>160</sup> Under RWS2 proposal, the institutional framing is more explicit and centralised: The UNICEF Afghanistan funding proposal specifies that "completed works will be officially handed over to the CDCs, which will assume the responsibility for revenue collection." This language clearly assigns formal ownership and financial management responsibility to CDCs, rather than to sub-committees. While CDCs may still delegate operational tasks to water committees, the proposal positions the CDC as the primary accountable institution at the point of handover. In contrast to RWS1, RWS2 therefore reflects a clearer institutional anchor, with CDCs explicitly responsible for post-handover management and revenue functions. See: UNICEF Afghanistan. (2021). Final Report: USAID Rural Water Supply, Sanitation and Hygiene (RWS) Grant: SC160225. Available at: UNICEF Sharepoint (Internal document). Document specifies that handed over systems had "a sub-water committee taking responsibility for the management of these systems.". UNICEF Afghanistan. (n.d.). UNICEF Afghanistan Funding Proposal to the United States Agency for International Development (USAID) Provision of Integrated WASH Services to One Million Beneficiaries in Afghanistan., specifies "Completed works will be officially handed over to the CDCs, which will assume the responsibility for revenue collection and O&M."

<sup>161</sup> The implications on the relevance of SWS ToC following the dissolution of CDCs are discussed in EQ1.2.

structures, creating tensions as communities perceived these external CDCs as private contractors rather than having confidence in the interventions as genuinely community-driven governance.

112. Communities generally viewed governance structures as trustworthy and fair, with evident community engagement and ownership through CDCs. Despite concerns or expectations to the contrary, the data collected revealed limited evidence of elite capture at the community level. The current de facto government's push to install clerics rather than local powerbrokers in key local decision-making roles may potentially strengthen perceptions of trust and fairness, though this remains to be seen.

113. However, trust in community governance for equitable implementation should not obscure the variability in its effectiveness across contexts. Some communities highlighted issues of limited attention to vulnerable populations. UNICEF Afghanistan stakeholders noted that CDC dissolution may ultimately benefit equity consideration, as these structures were perceived as male and elite dominated.<sup>162</sup> Conversely, based on Afghanistan Human Rights Situation report (2024), recent experiences of community development projects have seen the government deliberately excluding certain ethnic and religious communities from projects, raising new equity concerns about the evolving governance landscape.<sup>163</sup>

114. **Women's involvement in community water governance varied significantly from one community to another.** As discussed in EQ1.2, there are longstanding barriers to women's participation in water governance. More than half (52 per cent) of HHQ respondents identified barriers for women to get information about water from SWSs with women slightly more likely than men respondents to report barriers to information.<sup>164</sup> Household-level data collected found that just 3 per cent of households reported that women participate in WUC meetings and 8 per cent reported that there are active women leaders and spaces in their communities. Qualitative community-level data similarly highlights outlier communities demonstrating strong support for women's participation despite the increasingly restrictive context. For example, in Bamyan, where women have historically had a relatively stronger voice in community affairs, access to education and workforce participation, interviewed women demonstrated meaningful involvement in water governance in their communities. In most communities where there has historically been less access for women to participate in community affairs, data collected reflected that male community members were making decisions on behalf of women.

115. **Despite national level changes, there are localized opportunities to engage women in water governance.** Some rural directorates, for example in Bamyan, have been granting exemptions allowing engineers to train women in committee roles. Community-level data also revealed continuing participation in water governance among some specific communities. Data collected also proffered other solutions to the current barriers, including suggestions that women's ongoing participation in community water governance could be ensured by setting up informal committees at the village level.

116. **Women consulted as part of this evaluation expressed variable interest in participating in maintenance or governance roles.** Some women participating in data collection noted that they were accustomed to relying on male family members to communicate with relevant persons and were satisfied with this arrangement. Others expressed that women should not be more involved because maintenance and governance were roles for men. Other women interviewed simply stated that they have no interest and would prefer not to be involved in such activities and that specific men should be assigned for maintenance. This is notable, when considered in conjunction with the finding that men (46 per cent) were more likely than women (40 per cent) to report that there were no barriers to women's involvement, and that 79 per cent of women reported being "fully satisfied" with their level of involvement in water management. Furthermore, women were more likely to report that they were informed but not involved (72 per cent), as compared to men (55 per cent), and less likely to report that they are involved and have a say in decisions (21 per cent) than men (39 per cent). In this regard, women (18 per cent) were twice as likely as men (9 per cent) to report that there was room for improvement in their level of involvement in maintenance and governance roles.

117. **Building technical capacities in O&M is crucial to sustainability of solar water systems but has been lacking.** Reviewed TPM reports and 2023 National Consultation Workshop identified training in O&M as key

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<sup>162</sup> UNICEF. (2024). Summative Evaluation of the ECHO Supported Humanitarian Water, Sanitation & Hygiene (WASH) Programme in Afghanistan (2022-2023). Available at: <https://evaluationreports.unicef.org/GetDocument?documentID=19993&fileID=54386>

<sup>163</sup> RAWADARI. (2025). Afghanistan Human Rights Situation Report 2024. Available at: <https://rawadari.org/reports/afghanistan-human-rights-situation-report-2024/>

<sup>164</sup> 60 per cent of women users reported some barriers to accessing information compared to 54 per cent of men users.

for strengthening local water governance capacity.<sup>165</sup> Reviewed TPM reports identified issues including the absence of WUCs, failure to select or equip mechanics with proper tools, and lack of functional money collection systems for ongoing operational costs. Notably, UNICEF Afghanistan has modified the information stored in ActivityInfo for 2025 and now includes 'train water user committees' as a specifically logged activity with the number of men and women trained included.<sup>166</sup> This will enable more robust confirmation of activity implementation in the future.

118. Primary data collection found that such necessary O&M training, including of mechanics, had not systematically occurred as part of the WUC establishment process for the evaluation's temporal scope. When considered in light of the finding that just 36 per cent of O&M questionnaire respondents reported that there are technical skills available for system maintenance, this has implications not only for sustaining capacity of structures, but also of confidence in the overarching governance system as it evolves. Among those O&M respondents reporting gaps in local technical skills, respondents attributed these gaps to a lack of tools (20 per cent), parts (20 per cent), lack of funds for parts (35 per cent), and funds for labour (52 per cent).

119. **Governance structures and procedures were regarded as being capable of delivering on short-term, acute service needs.** For instance, when systems malfunctioned, communities could contact external actors for support through locally trusted authority figures. However, the national political transition led to changes in structures and procedures that disrupted and severed these pathways for communication, coordination, and accountability. While direct evidence of governance structure functionality is limited, available data points to lack of operational regularity particularly following change in government. There is limited secondary data with which to triangulate the role and functioning of governance structures, but the available TPM datasets raise questions about CDC functionality, noting gaps in regular meetings by CDC members (15 per cent reported no meeting records available in n=42 observations according to TPM data). Qualitative findings from communities and sector experts also showed that there was evidence of the functioning of governance structures for site selection, fee collection, awareness raising and other key issues previously but that since changes to regime and structures, meetings are not happening regularly, if at all.

#### 5.4 Contribution/Impact

**What are the intended and unintended contributions of solar-powered and piped water supply systems on children, women, communities, and the environment in Afghanistan, particularly regarding health, well-being, climate change, and social outcomes?**

**Key findings:** Solar-powered water systems have contributed positively to health, safety, and well-being, with 84 per cent of users reporting improved family health and widespread perceptions of reduced disease and injury risks. Household-level access enhanced safety and dignity, particularly for women and children, with 88 per cent feeling more protected, while time savings (86 per cent) and lower water costs (64 per cent) eased daily burdens and supported productive use. At community level, SWSs reduced water-related tensions and supported social cohesion where supply was adequate without major conflicts reported. However, these benefits are constrained by water quality issues, declining groundwater, and insufficient supply in some areas, with climate-related risks threatening long-term gains without stronger monitoring and water resource management.

120. Impact was explored to a limited extent. As highlighted in the IR, the evaluation focused on assessing contributions rather than conducting rigorous impact assessment. This reflected both the limited scope of impact as an evaluation criterion and methodological constraints, given that the evaluation was not designed as an impact evaluation and lacked baseline data and comparison groups necessary for causal attribution. The HHQ included limited questions on key outcome pathways: water collection times, health of family, cost of water and safety in collecting water. These quantitative findings were supplemented by qualitative exploration of the intervention's broader contributions.

121. Importantly, while many positive impacts were noted, the intermittent functionality and limited sufficiency of water provided through the systems detracted from impacts across all categories. When SWSs

<sup>165</sup> UNICEF Afghanistan. (2023). National Consultation Workshop Report. Available at: UNICEF Sharepoint (Internal Document)

<sup>166</sup> The number of men and women trained has been a variable included in the Access to Water ActivityInfo sheets since 2023 but 2025 is the first-year values have been reported.

were not functioning or where they were not meeting water needs, households were forced to revert to other water sources which were often time-intensive, costly and/or unsafe.

#### **EQ 4.1: Have solar-powered water supply systems contributed (intended or unintended) to the health and well-being of children, women, and communities?**

##### **Health Impacts**

122. **Communities identified health improvements as a main benefit of solar water systems, including reduced waterborne diseases (such as lower AWD, pneumonia, cholera incidences).** Community members in qualitative and quantitative data consistently highlighted the health benefits of the switch to water provided by the SWSs. In the HHQ, 84 per cent of users reported improved family health. In qualitative data, women IDIs highlighted the positive impacts of water on health and reducing disease rates, as well as reducing exposure to physical injury (such as getting bitten by dog bites, traffic accidents, and falls while collecting or transporting water, strain from carrying heavy containers over long distances). These benefits are substantiated by a growing body of literature on reduced exposure to waterborne diseases and improved hygiene through household water access.<sup>167,168</sup> However, water quality concerns persist in some locations, either from the outset of SWS installation (such as saline water in Badghis) or developing over time (worsening water quality in Jawzjan reported), which prevents households from drinking the water and limits health gains. Importantly, without water quality testing, it is not possible to confirm whether the reported water quality issues are causing negative health impacts.

123. **Adaptations to the SWS implementation approach as well as joint activities with the other UNICEF divisions aim to improve health impacts of water supply interventions going forward.** Ongoing AWD and cholera outbreaks highlight that access to safe water alone is insufficient for good health without the simultaneous adoption of safe hygiene practices.<sup>169</sup> The increasingly systematic integration of WSPs into solar water system implementation is expected to improve health impacts by identifying and mitigating risks to water safety throughout the system lifecycle. UNICEF Afghanistan's WASH section more broadly has taken a joint approach with the Social and Behavioural Change (SBC) section to strengthen ensure community engagement for long-term processes.

##### **Social & Economic Impacts**

124. **There were positive impacts on the safety of community members in collecting water.** Out of those surveyed, 88 per cent felt safer collecting water. Safety was also a main benefit reported in qualitative data, linked both to protection from physical harm (i.e. protection from injury) and mental harm (e.g. protection from verbal harassment, being photographed).

125. **Significant time savings open opportunities for productive activities, through the broader context limits these opportunities.** Time saved through SWS use was a major benefit, indicated by 86 per cent of HHQ users and triangulated with qualitative findings. In qualitative data, women generally specified that time savings enabled greater ease or engagement in chores/domestic responsibilities. In a few cases, women specifically indicated greater use of time for income generating activities such as tailoring. The broader context of limited opportunities for economic activity, particularly in recognition of lowering agricultural yields due to drought, should be recognized as a mitigating factor. Furthermore, as women have been forced out of any public-facing positions, their capacity to engage in economic opportunities is necessarily extremely constrained. Reduced time spent collecting water also allowed greater educational access, though again contextual constraints (especially the ban on girls in secondary school as well as broader limitations in education access) necessarily limit these impacts.

126. **The lower cost of water from solar systems freed up economic resources in households for other potential uses.** Improved cost of water was reported by 64 per cent of users in the HHQ. The impact of any cost savings is notable given the destitute conditions many community members described, similarly reflected in secondary data.

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<sup>167</sup> Mohammad Daud Hamidi, Marco J. Haenssger, H. Chris Greenwell. (2023). Determinants of household safe drinking water practices in Kabul, Afghanistan: New insights from behavioural survey data. Available at: <https://doi.org/10.1016/j.watres.2023.120521>

<sup>168</sup> Urbanus Wedaaba Azupogo, Meshack Achore, Florence A. Dery, Elijah Bisung. (2023). Health implications of coping with water insecurity at the household level. Available at: <https://doi.org/10.1016/j.wasec.2023.100135>.

<sup>169</sup> The mid-September Whole of Afghanistan Assessment found that 18 provinces had high levels of AWD (>55 per cent) among children under 5, revealing the persistent gap between water access and behaviour change. REACH Initiative. (2024). Whole of Afghanistan Assessment 2024. Geneva: REACH Initiative. Available at: <https://data.humdata.org/dataset/whole-of-afghanistan-assessment-2024-analysis>.

127. **Access to solar water systems has generated positive social benefits beyond individual households. By providing an alternative water source, the systems have reduced competition and social tensions previously associated with accessing finite water resources from distant or privately controlled sources.** Qualitative findings indicate that women and children who previously experienced hostility and humiliation when collecting water from privately owned wells no longer face these negative social interactions. The reduction in time spent traveling to and queuing at communal water points has also decreased friction between community members competing for limited access. However, these social cohesion benefits are conditional on adequate water supply. In communities experiencing declining water levels, the risk of low-level tensions is emerging as competition intensifies between different water users (discussed further in EQ4.2).

**EQ4.2: Have there been any other impacts (intended or unintended) on children, women and communities (including climate change and social outcomes)?**

128. **UNICEF's shift to prioritize solar systems over diesel-powered pumping has positive implications for greenhouse gas emissions.** Additionally, where the installation of SWSs replaced diesel generators in communities, the installation of these systems can be said to have reduced greenhouse gas emissions. However, prior to SWS installation, communities largely reported relying on manual water collection (e.g. dug wells, surface water) which does not consistently produce greenhouse gasses. Therefore, while installing SWSs instead of diesel-powered systems avoids additional emissions, the evidence does not consistently support the claim that these solar systems have reduced greenhouse gas emissions in communities previously dependent on manual methods of collection.

129. **Solar systems introduce the potential for negative climatic impacts without proper monitoring or reinvestment in the water table, though there is insufficient data to confirm whether these impacts are occurring.** The scaling-up of solarized pumping allows deeper groundwater to be removed faster than ever before. This, combined with changing climatic conditions, puts Afghanistan at higher risks of long-term detrimental impacts. UNICEF, along with other donors, have supported groundwater mapping, yet critical gaps remain. Over the project period, groundwater levels have declined in various regions.<sup>170</sup> Lower groundwater cannot be directly tied to SWS installation as groundwater extraction for agricultural use and the severe drought in the country are also significant contributing factors. Qualitatively, stakeholders did highlight that water levels have declined over time, reporting that "the water level was higher before, but now it has gone deeper" and wells designed for specific depths cannot reach receding water tables. The project demonstrated some evolution through the climate resilience WASH planning process that incorporated risk mapping for floods and landslides, though this did not cover the fundamental challenge of groundwater sustainability in contexts of declining rainfall and the impacts of climate-induced water scarcity. Key informants identified the critical need for water recharge interventions, such as dams, wells or other mechanisms to replenish aquifers depleted by changing rainfall patterns and continuous extraction. Overall, continuing groundwater monitoring levels is critical for Afghanistan to facilitate water security amidst climate change and ensure future water infrastructure is well adapted.

130. **The solar water systems have generally supported social cohesion where water supply is sufficient and access is equitable.** No community member reported major conflicts as a result of SWS installation. Qualitative data demonstrates the importance of community involvement in planning, which helped mitigate conflicts during installation stage, especially over the location of taps and borehole sites (see EQ1.1 for further details). Despite these generally positive social impacts, there is a risk of emerging tensions in communities where water cannot meet all community member needs. Community members reported that declining water levels may heighten risk of low-level conflicts in some locations. Drought conditions could exacerbate these tensions as groundwater extraction increases and competition intensifies between different water users, complicating WASH service delivery. These findings suggest that, while the intervention design successfully prevented installation-related conflicts, the sustainability of social cohesion benefits depends heavily on maintaining adequate water supply.

131. **The socio-economic impacts of access to SWS for those households that had not been displaced have also been positive.** This is particularly the case when compared to those who have been displaced or

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<sup>170</sup> UNICEF and Stockholm International Water Institute (SIWI). (2025). Climate Risk Analysis for the Water, Sanitation and Hygiene Sector in Afghanistan. Available at: <https://knowledge.unicef.org/wash/resource/climate-risk-analysis-water-sanitation-and-hygiene-sector-afghanistan>.

returnees to communities where systems have been installed but who have been excluded from access to the water provided.

## 5.5 Coherence and Coordination

**How coherent and well-coordinated have the working relationships been among key stakeholders, such as the O&M committee, CDCs (until 2024), communities, mechanics, and other relevant actors, during the implementation of the solar-powered water supply systems in rural Afghanistan before and after the political transition?**

**Key findings:** Coordination and coherence among key stakeholders was generally strong during planning and construction, with effective collaboration between UNICEF Afghanistan, community structures, and other counterparts, supported by joint workplans pre-transition and extender roles post-transition. Community-level coordination remained positive, with local governance structures seen as responsive to community needs. However, coordination weakened after installation, as communities reported delays or limited responsiveness from external actors for maintenance and major repairs.

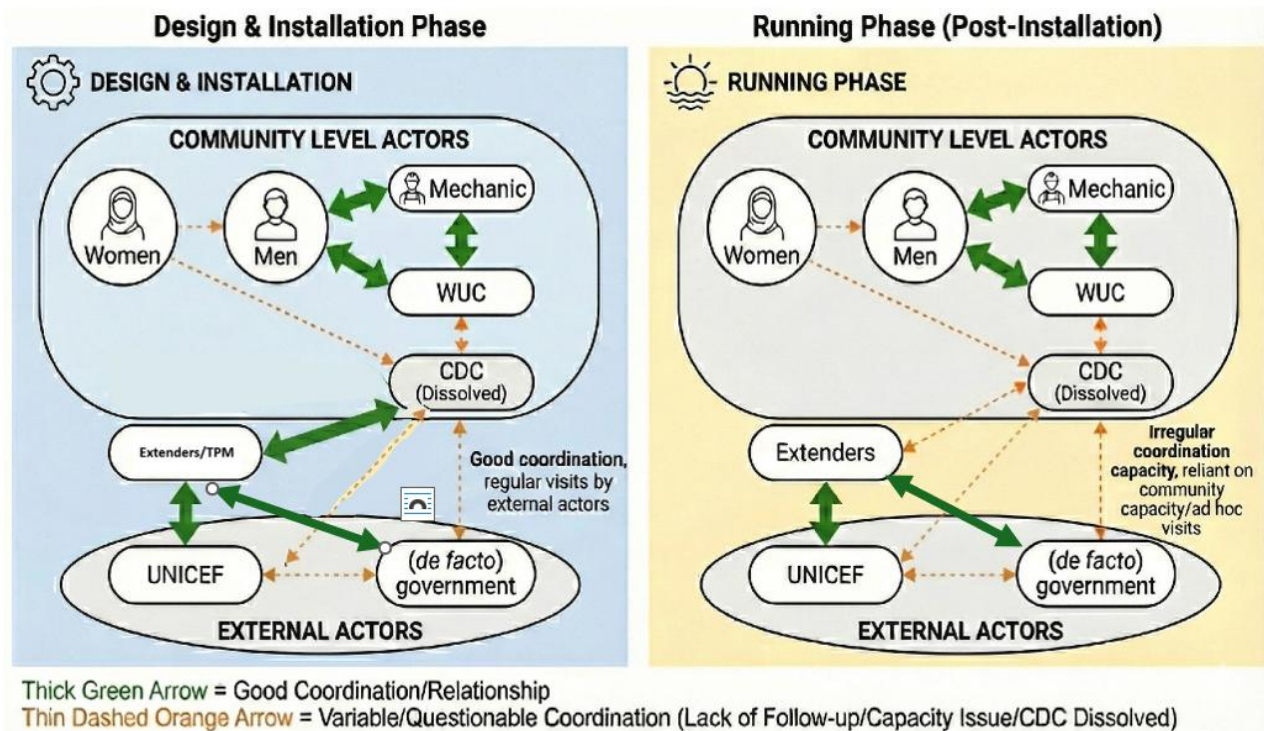
### EQ5.1: How effectively did the key stakeholders collaborate and coordinate throughout the project?

132. **Coordination and coherence within communities is generally positive.** Community level stakeholders described strong coordination and coherence between community-level water governance structures and community members with largely positive perceptions of water governance structures effectiveness in terms of understanding and responding to community needs. Community-level coordination is discussed in detail in EQ3.4.

133. **Primary and secondary data generally indicate strong collaboration and coordination between UNICEF Afghanistan, (de facto) government, and community partners during the planning and construction process both pre-and post-political transition.** Prior to the government collapse, jointly established rolling workplans were positively reviewed as contributing to collaboration/coordination of SWS investments. These workplans, executed with the support of NTA's, were discontinued after the government collapse. However, UNICEF Afghanistan's transition of previous NTA's to extender roles enabled UNICEF Afghanistan to continue coordination with the DfA with minimal disruption.

134. However, coordination between community and external actors post-installation is weaker with stakeholders reporting consistent delays or absence of external support (Figure 6). As discussed in EQ2.2, while communities could reach external support providers (D/PRRD, UNICEF Afghanistan, other INGOs and NGOs), they had limited confidence in the responsiveness of these actors to deliver timely or reliable support. This limited capacity to respond to support requests is supported by the O&M questionnaire where 30 per cent of respondents reported they had never received the support they requested. In the context of extremely high needs, with dwindling financial resources, capacities for response remain constrained. As discussed in EQ1.2, community members differed in their views on how the dissolution of CDCs affected coordination with most reporting negative impacts on coordination.

Figure 6 Coordination between various actors during different phases



Source: Developed by the ET based on evaluation data

135. **Sector-level coordination has eroded post political transition.** Sector-level coordination was conducted primarily through the WSG chaired by (de facto) MRRD, which brought together (de facto) government, NGOs, and private sector partners. The WASH Cluster coordinated emergency WASH responses among (I)NGOs but did not involve the de facto government post transition and therefore did not serve as the sector-wide coordination mechanism. Beyond the WASH sector, UNICEF Afghanistan is involved in the AWAP, a broader coordination for water investments in the country.

136. UNICEF Afghanistan stakeholders highlighted the importance of the WSG for enhancing coordination and alignment which had limited functionality post-transition according to KII. Qualitative findings gathered from UNICEF Afghanistan staff highlighted the importance of the MIS system, supported by UNICEF Afghanistan and launched in 2019, as particularly useful for accountability and coordination while also acknowledging that this system may be less active post-transition. Some UNICEF Afghanistan stakeholders highlighted the difficulty in managing the cross-cutting nature of SWSs, being used to fulfil both emergency and development needs. While the UNICEF Afghanistan WASH section demonstrated flexibility in integrating piecemeal funding with various conditionalities to enhance system quality, stakeholders were less positive about UNICEF Afghanistan's ability to link with external development funding.

137. **There are broader issues in water governance and institutional capacity that are recognised in the country preceding the DfA takeover to today.**<sup>171</sup> Several recommendations developed during the National Consultation Workshop on the impact of climate change on water resource management highlight capacity and coordination gaps that are negatively impacting the broader water sector.

138. **UNICEF Afghanistan's coordination with USAID demonstrated strong collaboration, with evidence indicating a collegial relationship.** Following the DfA takeover, USAID supported programmatic adaptations including shifting to direct fund transfers to CDCs, scaling-up NGO partnerships, implementing through private sector contractors, and transitioning from government-contracted NTAs to employing extenders through a third-party company.

<sup>171</sup> UNICEF Afghanistan. (2023). National Consultation Workshop Report. Available at: UNICEF Sharepoint (Internal Document)

## 5.6 Efficiency

How efficiently were the programme’s human and financial resources used to enable optimal attainment of the expected outcomes and to what extent were management and M&E systems appropriate to enable achievement of intended results in an economic and timely manner?

**Key findings:** Overall, resources were used with reasonable efficiency in the design and implementation of solar-powered water systems, despite significant contextual and data constraints. Average per capita costs were low to moderate but highly variable, and implementation through CDCs generally enabled cost savings compared to implementation through (I)NGOs. Efficiency has declined after the political transition due to inflation, supply chain disruptions, and shifts in delivery modalities. UNICEF Afghanistan largely exceeded drinking water targets and demonstrated strong financial performance, including high expenditure rates and reinvestment of cost savings to expand coverage. However, recurrent implementation delays, wide cost variation, data limitations, and the absence of systematic post-construction monitoring constrain a full assessment of efficiency and raise concerns about long-term value for money.

### EQ 6.1 To what extent were resources (financial, human, and technical) used efficiently in the design and implementation of the water supply systems?

139. **Implementation costs per beneficiary based on ActivityInfo data reveals wide variation highlighting contextual variability; limitations in data structure prevent further interpretation.** On average, implementation costs were approximately 3,000AFN (45USD) per person for construction projects and 800AFN (12USD) per person for rehabilitation projects. For construction projects, these costs varied with some projects costing significantly more. Average costs are higher for construction of public taps compared to household connections due to a number of extremely expensive constructions reported in Daikundi and Jawzjan (costs per beneficiary over 700USD) which a UNICEF stakeholder attributed to higher material cost and logistic expenses associated with Daikundi. With these values removed, average costs are lower for construction of public taps (average of 36 USD/person) compared to household taps (43 USD/person), an expected pattern given the larger volume of work required for household connections. An important caveat in calculating per capita costs is the exchange rate volatility experienced in Afghanistan, particularly immediately following the political transition. This volatility significantly impacted the actual costs of programme implementation leading to unexpected increases or decreases in procurement costs.<sup>172</sup> Notably, there were no benchmarks or objectives set in terms of cost except the expectation that solar and gravity-fed systems (GFS) were more cost-effective compared to hand pumps due to the expectation of longer-term functionality. This judgement is based on the assumption that the “life span [of piped systems] easily extends to 20 [sic] years” compared with the finding that a DACAAR study showed that approximately half of the hand pumps in Afghanistan were not functioning<sup>173</sup> combined with the fact that handpumps have a lower pumping depth reducing the efficiency of extraction due to significant drawdown in the water table. While highlighting that many solar systems remain functional for up to a decade, this evaluation has also noted regular system degradation reducing functionality for the majority of systems (if not resulting in complete non-functionality) within four or five years. As the evaluation does not include a comparison with handpumps or GFS, it is not possible to draw a final conclusion about cost efficiency beyond calling into doubt the conclusion that solar systems are undoubtably “worth the extra investment” compared to hand pumps given that they are approximately twice as expensive in estimated per-capita cost.<sup>174</sup>

**Table 20 Cost per beneficiary variance for solar water systems<sup>175</sup>**

Intervention type		Average (USD)	Average (AFN)
Construction	HH connection	USD 42.86	AFN 2,857.29
	Public taps	USD 36.34	AFN 2,423.08
Rehabilitation	HH connection	USD 14.46	AFN 963.88
	Public taps	USD 10.65	AFN 709.86

Source: UNICEF Afghanistan ActivityInfo Water Supply data, downloaded 6 November 2025.

<sup>172</sup> UNICEF Afghanistan. (2024). Final report to the European Union for the project: Mitigating the Effects of COVID-19 through Nutrition, WASH, and Protection. Available at: UNICEF SharePoint (Internal Document). Also noted by UNICEF stakeholders in KII.

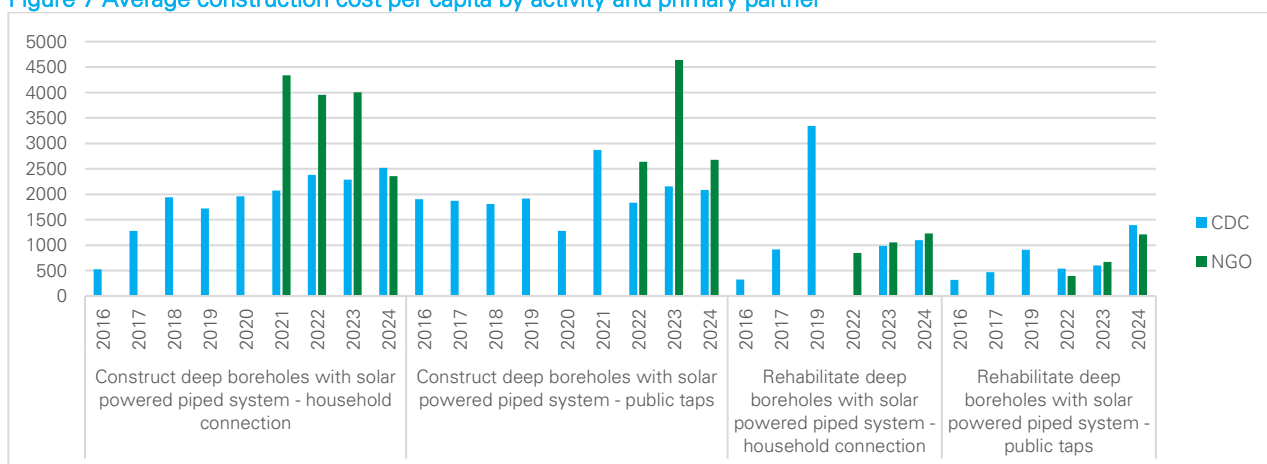
<sup>173</sup> UNICEF Afghanistan. (2016). Annual WASH Report to Donors-2016. Available at: UNICEF Sharepoint (Internal Document)

<sup>174</sup> Based on comparisons of per capital cost presented in the 2016 and 2017 annual reports to donors.

<sup>175</sup> Minimum and maximum values are not presented due to data quality concerns. the structure of beneficiary reporting, where beneficiaries are reported during previous years (which would artificially inflate cost calculations by the ET). As ActivityInfo data is spread across several sheets with different column orders preventing collation, it is not possible to further interpret this data. The estimation of costs in USD is based on an exchange rate of 1USD=0.015 AFN.

140. **Implementation through the CDC as the primary partner versus NGO partners generally enabled cost savings; implementation has gotten more expensive post transition.** Working through the CDC was an intentional UNICEF Afghanistan strategy to channel rural water supply implementation through government structures, building and strengthening government institutions and building their capacity. The government had indicated capacity to implement and specifically requested that UNICEF Afghanistan work through government systems rather than NGOs for community water supply (with the exception of emergency WASH assistance). This CDC-led approach also proved more cost-efficient than NGO implementation, though institutional strengthening was the primary rationale. ActivityInfo data, once major outliers are removed, generally confirms this assertion with the exception of 2024 public tap rehabilitation and household connection construction where NGOs were slightly cheaper per capita. The economic chaos following the political transition raised implementation costs with high inflation and supply chain disruptions eroding UNICEF Afghanistan’s purchasing power and efficiencies.<sup>176</sup> Disaggregating key HHQ indicators by implementing partners shows similar performance between systems whether implemented by NGOs or CDC with the exception of water availability and functionality, where systems implemented with NGOs as the primary partner performed slightly better. However, given the noted impact of groundwater availability on functionality and availability and distinct geographic and temporal patterns of CDC/NGO implementation, the ET cannot attribute differences in system performance to implementing partner.

**Figure 7 Average construction cost per capita by activity and primary partner<sup>177</sup>**



Source: UNICEF Afghanistan ActivityInfo Water Supply data, downloaded 6 November 2025.

141. **Funding from UNICEF enabled implementation to exceed drinking water targets despite recurrent delays that reduced implementation efficiency.** Over the implementation period, in addition to the globally experienced delays due to COVID-19, implementation experienced context-specific delays. These delays were primarily attributed to coordination with the (de facto) authorities as well as winter weather conditions. In some cases, these delays impacted UNICEF Afghanistan’s ability to complete specific programme targets, such as WSP targets under the USAID 2016-2020 RWS programme.<sup>178</sup> Despite these challenges, UNICEF Afghanistan generally exceeded Results Assessment Module drinking water provision targets for the years in which targets were reported.<sup>179</sup>

**Table 21 Recurrent delays affecting SWS implementation and their resolution**

Delaying factor	Affected time period	Resolution
Approvals	Throughout	<b>Ongoing:</b> The approval process in multilayered encompassing both UNICEF Afghanistan and (de facto) government processes. According to KIIs and annual

<sup>176</sup> UNICEF Afghanistan. (n.d.). Combined Outcome/Output Reports and End-Year Summary Narrative 2022. Available at: UNICEF Sharepoint (Internal Document)

<sup>177</sup> The primary partner was listed in ActivityInfo as either MRRD or a specific (I)NGO. When implemented through the MRRD, CDCs were responsible for construction. Post Taliban takeover, money (AFN) was transferred directly to CDCs to ensure compliance with sanctions restricting transactions through the government.

<sup>178</sup> As discussed in the Effectiveness criterion, there was only an indicator specifically for solar WSS’s in 2023 reviewed.

<sup>179</sup> Targets were overachieved for 2019 and 2020-2023 based on UNICEF Afghanistan. (n.d.). Combined Outcome/Output Reports and End-Year Summary Narrative 2023. Targets were not achieved in 2020; the operational delays to construction process during COVID are a noted contributing factor. Targets were almost achieved for 2018 (94% achievement) based on UNICEF Afghanistan. (n.d.). Combined Outcome/Output Reports and End-Year Summary Narrative 2018. No targets were specified for 2016. The ET does not have the updated indicator values for 2024 achievements.

		reports, MoU signatures continue to cause delays, despite considerable advocacy on UNICEF Afghanistan's part.
Winter weather	Throughout	<b>Ongoing:</b> Construction works frequently halted during the winter months due to both environmental (impassable roads due to snow, impenetrable ground for drilling due to freezing conditions etc.), as well as (de facto) government-mandated stop work orders.
WSP design	2016-2020	<b>Resolved:</b> The initial photo-based design of the WSP proved ineffective requiring adaptation to a drawing-based approach which caused delays. <sup>180</sup>
Government collapse	2021-2022	<b>Resolved:</b> Initially, the government collapse and subsequent security issues, supply chain issues, economic contraction and need to shift implementation modalities significantly delayed implementation and resulted in the discontinuation of the development of the national water safety framework. Many activities were initially put on hold as UNICEF Afghanistan navigated the political complexities of the context and sanctions, implementing key changes. Cash unavailability affected most of the infrastructure components implemented through CDCs and NGO partners. Elaboration of a guidance for engaging with CDCs enabled resumption of implementation through CDCs with implementation subsequently proceeding at a much faster rate than under the prior government.

142. Although the evidence for a comprehensive financial efficiency assessment is thin due to the absence of complete data sets on financial expenditure over the years and against plans, a few key indicators suggest an efficient use of funds that effectively translated resources into outputs. These are:

- **A high utilization rate and performance-based funding:** The USAID RWS1 programme achieved an outstanding expenditure rate of 99.99%. Furthermore, the Ru-WatSIP programme successfully secured successive additional funding in 2016 and 2017 because its performance was deemed satisfactory under the Government's performance-based budgeting policy, suggesting an efficient use of the resources.
- **Measurable cost-efficiency and increased coverage:** The most compelling finding stems from the USAID financing, which reported realizing a lower actual per capita cost for WSS installation than initially projected. This cost efficiency was not merely a saving but was reinvested to scale the programmes results, enabling UNICEF Afghanistan to significantly expand its reach from a target of 525,000 to 811,345 people with improved drinking water access.

143. It is important to note that the lack of complete datasets on the pace of expenditure and the spending against planned budgets across the years and regions limits the ability of the evaluation to fully rule out inefficiencies, such as the reported tendency of the WASH department to engage in accelerated year-end spending, which can undermine strategic planning.

### **EQ6.2 How effectively does the management and M&E systems of the project ensure quality and efficiency in achieving the expected results, considering factors such as resource management (human and financial), risk assessment, and mitigation measures?**

144. UNICEF Afghanistan remedied acknowledged gaps in organizational monitoring capacity through signing agreements for external TPMs beginning in 2017. Third party monitoring was first contracted through DACAAR in 2017 and expanded to Citizens Organization for Advocacy and Resilience (CoAR) and Organization For Relief Development (ORD) in 2020.<sup>181</sup> In August 2023, these NGOs were replaced by Apex.<sup>182</sup> Initial TPM coverage had gaps with DACAAR covering approximately 60 per cent of the total water systems completed between 2017 and 2019.<sup>183</sup> However, this coverage improved over time. UNICEF Afghanistan stakeholders emphasized the completeness of TPM coverage which is triangulated by ActivityInfo data indicating that all installations were monitored at least once by project completion in 2023

<sup>180</sup> UNICEF Afghanistan. (2021). Final Report: USAID Rural Water Supply, Sanitation and Hygiene (RWS) Grant: SC160225. Available at: UNICEF Sharepoint (Internal Document)

<sup>181</sup> UNICEF Afghanistan.(n.d.). Combined Outcome/Output Reports and End-Year Summary Narrative 2020. Available at: UNICEF Sharepoint (Internal Document)

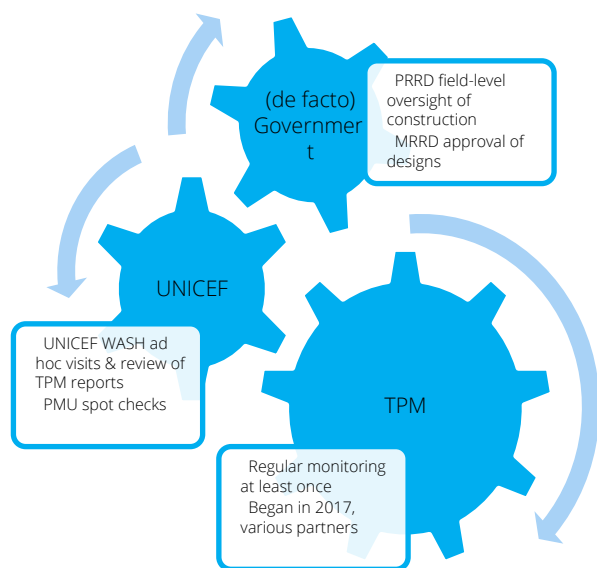
<sup>182</sup> UNICEF Afghanistan. (n.d.). Combined Outcome/Output Reports and End-Year Summary Narrative 2023. Based on a KII with a UNICEF stakeholder, the ACO is in process of replacing Apex with another firm.

<sup>183</sup> DACAAR. (n.d.). TPM Final Report (February 2017 to December 2019). Available at: UNICEF Sharepoint (Internal Document)

and 2024.<sup>184</sup> Importantly, UNICEF Afghanistan interviewees and TPM reporting noted that continued capacity building was needed for TPM providers.

145. **Concentration of M&E efforts during the design and implementation stage had a positive impact on execution quality and was a practical decision to ensure that teams could make timely and effective adjustments to SWS installations during the most resource-intensive stage of implementation.** During this stage, there were multiple avenues of monitoring to provide feedback to UNICEF Afghanistan including UNICEF Afghanistan staff/extenders, TPMs, and partner/WASH Cluster reporting (Figure 8). UNICEF Afghanistan became increasingly systematic in storage of site-level information in internal (ActivityInfo) and external (MRRD MIS) information management systems.

Figure 8 Oversight during design and construction



146. UNICEF Afghanistan supported the creation and ongoing maintenance of the MRRD database (MRRD MIS), providing technical input in the database design and operational support through NTAs and extenders. This database serves as a sector resource with WASH partners adding data into this government-maintained system, representing sustainable M&E infrastructure that outlasted the political transition. The MRRD database represents systems strengthening, creating government-owned data management capacity that supports sector-wide monitoring and coordination beyond UNICEF's specific programming. While review of the database shows new entries following the political transition, this evaluation did not assess data quality, partner inputs, capacity for maintenance, or the extent to which the data informs sector decision-making.<sup>185</sup>

147. **Monitoring enabled improvements in construction quality, though reviewed data suggests these improvements were not complete.** KIIs and

review of available TPM reports confirm that improvements were made following monitoring visits. KIIs and UNICEF Afghanistan documentation highlighted the importance of TPM findings in systematically improving construction quality. However, in the available final TPM reports, some corrective actions were not acted upon, suggesting existing gaps in construction quality. For example, in the DACAAR final report covering 2017-2019, of the 3,396 findings identified during the TPM period, 1,931 were rectified, though the report notes that projects are ongoing, so this final number does not indicate an accurate assessment of 'final' unrectified issues, nor are the findings specific to SWSs.

148. **The combination of the absence of design references, data collection and reporting formats and capacity issues reduced the effectiveness of TPM support.** At the installation level, the absence of project design documents reduced TPM capacity to assess sites against relevant standards.<sup>186</sup> Additionally, both TPM reports and UNICEF Afghanistan stakeholders identified capacity issues for TPM staff which reduced monitoring capacity. UNICEF Afghanistan stakeholders highlighted the complexity of finding TPM staff with sufficient engineering expertise to successfully monitor complex installations. This difficulty is similarly reported in the Apex final report which recommended enhancing field team training and resources with refresher training on monitoring construction activities and performing quality oversight, trainings on high-quality photography and the need for other "necessary tools and trainings to better handle project challenges".<sup>187</sup> Furthermore, ET review of the Apex assessment tool indicates issues of inconsistent skip patterns, unclear question wording and duplicated questions, reducing the quality and usability of collected

<sup>184</sup> The format of the ActivityInfo database may obscure TPM frequency as an installation may be reported across multiple years. TPM reports were not systematically logged before 2023. UNICEF reported that each USAID-funded installation was monitored at least four times during implementation.

<sup>185</sup> As discussed under the Coherence and Coordination criterion, qualitative findings gathered from UNICEF Afghanistan staff highlighted the importance of the MIS system for accountability and coordination while also acknowledging that this system may be less active post-transition.

<sup>186</sup> As reported in reviewed TPM reports and identified in available Apex datasets.

<sup>187</sup> Apex Consulting. (2025). Third Party Monitoring WASH Services Fiscal Year 2024 End of Project Report. Available at: UNICEF Sharepoint (Internal Document)

data.<sup>188</sup> According to a UNICEF Afghanistan stakeholder, the institution of a filtering of information to identify the most critical aspects among the numerous datapoints improved the use of TPM data, enabling UNICEF Afghanistan to effectively prioritize among issues.

149. **At a macro level, it was difficult to translate detailed site-level data into broader trends that could inform learning.** Available final TPM reporting does not consistently provide data disaggregated in a way that enables understanding of the main issues affecting solar water systems as opposed to other visit types. Notably, Apex’s end-of-project report does not include specific recommendations on SWSs but does not clearly state whether the other recommendations also apply to SWSs. According to UNICEF Afghanistan stakeholders, datasets provided by TPMs were not in a usable format to develop these learnings by UNICEF Afghanistan or the evaluation team independently. Furthermore, the evaluation team’s review of available final reporting from TPMs suggests gaps in TPM analytical capacity which may misdirect UNICEF Afghanistan resources. For instance, there are issues in interpreting evidence<sup>189</sup> and inclusion of broad generalizations based on very limited population sets.<sup>190</sup>

150. **At the design stage, the lack of systematic post-construction functionality monitoring was based on the assumption of long-term functionality, an assumption this evaluation challenges.** Neither UNICEF Afghanistan nor the (de facto) MRRD were able to commit resources for systematic post-construction monitoring, though UNICEF Afghanistan staff and some de facto DRRD staff<sup>191</sup> reported conducting ad hoc visits when feasible. However, de facto DRRD staff face significant constraints: insufficient transportation budgets limit their ability to take ownership of monitoring and restrict even ad hoc visits. UNICEF Afghanistan stakeholders identified the absence of post-installation M&E as a major gap, noting that, without systematic monitoring to rapidly identify and address issues beyond community capacity, investment efficiency is reduced.

151. **Programme staffing was generally considered sufficient to manage the programme under current implementation arrangements through CDCs; the dissolution of CDCs and requirement to move all implementation through the private sector and (I)NGOs will require additional management resources.** UNICEF Afghanistan relied on the training CDCs received through the much broader National Solidarity Programme, and its successor the Citizens’ Charter, to be able to implement and monitor local construction.<sup>192</sup> This enabled UNICEF Afghanistan to bypass lengthy UN procurement processes for more efficient implementation. In the absence of CDCs moving forward, this burden will fall to UNICEF introducing additional responsibilities to staff that acknowledged high workloads in a complex context. Additionally, most UNICEF Afghanistan stakeholders felt that ensuring community ownership of the projects would require additional support when implemented outside of CDCs framework. The sense of ownership that could previously be counted on would now require additional community sensitisation efforts, introducing additional staff time requirements during implementation and additional M&E needs post installation.

## 5.7 Lessons Learned

**Key findings:** Key lessons show that while community ownership and willingness to contribute are strong, they cannot compensate for asset degradation within four to five years of installation, making long-term technical and financial support essential for sustainability. Future programmes should seek a better balance between a primary focus on installation and ownership to protecting capital assets through rapid repair mechanisms, as well as a continuation of regional technical support and enforceable quality controls. The programme demonstrated the importance of operational flexibility, strong partnerships, and adaptive donor relationships in sustaining delivery during political transition. Preserving early community

<sup>188</sup> The ET did not review the Dari/Pashto versions to confirm if this issue persisted in local languages. The absence of skip patterns made it unclear how to interpret negative responses, i.e. as a not applicable versus a negative finding.

<sup>189</sup> For example, in Apex’s final report, covering September 2023-February 2025, suggests enhanced focus on solar-powered water supply systems based on the higher total corrective action counts. However, the report author does not acknowledge that a much higher proportion of visits concerned SWSs and thus it may be the volume of visits, rather than capacity gaps, driving these trends.

<sup>190</sup> For example, based on consistent application of safe water storage practices among 25 households: The Apex Consulting. (2025). Third Party Monitoring WASH Services Fiscal Year 2024 End of Project Report. report concludes that “These exceptionally consistent results across diverse zones indicate that current training and awareness programmes have been comprehensively understood and implemented at the household level, representing a significant achievement in promoting this fundamental public health measure. The absence of any non-compliance cases suggests that proper water storage has become an established norm in these communities, likely contributing to reduced risks of waterborne disease transmission.”

<sup>191</sup> De facto staff, i.e. those staff retained following the transition of national government in mid-2021.

<sup>192</sup> UNICEF Afghanistan. (2022). Background Note on CDCs in Afghanistan. Available at: UNICEF Sharepoint (Internal document)

engagement, construction-phase quality assurance, and flexible implementation models, while strengthening post-installation support systems, is critical for future programming.

### **EQ 7.1 What are ways to improve engagement, utilization, and strengthening of ownership and accountability as well as integration and national ownership?**

152. **UNICEF must balance the objective of evidencing inclusive engagement with context-specific operational and do-no-harm considerations.** The evaluation found strong results within areas of primary data collection, with 93 per cent of O&M personnel reporting community consultations and 86 per cent of solar water users expressing satisfaction with their level of involvement. However, the absence of standardized, disaggregated documentation on consultation processes meant that systematic inclusion of women and marginalized groups beyond these areas of data collection could not be verified. This limitation should not be interpreted as a requirement for UNICEF to routinely collect sensitive inclusion data. Rather, it highlights the need for contextually informed judgement grounded in international norms to determine whether, how, and to what extent inclusion is pursued, evidenced, and communicated, with do-no-harm considerations as the primary driver of decision-making.

153. **Community willingness cannot compensate for degradation of capital assets.** The evaluation demonstrates that community commitment is not the primary limiting factor for sustained access; degradation of capital assets is. Community willingness to maintain systems and contribute financially remains exceptionally high (86 per cent reported confidence in maintenance, 80 per cent were willing to contribute more if needed).<sup>193</sup> However, the data shows deterioration which occurs within four or five years primarily due to the lack of technical capacity and external financial support for major component failures (pumps, solar panels). The institutional learning is that the strategic focus must balance sustaining strong community ownership (which is naturally high) to protecting the capital asset. This will require identifying and allocating funding to support long-term asset protection, such as performance contracts that ensure external technical support is activated upon major failure, safeguarding the asset value against rapid, system-eroding decay. In more stable contexts, engagement with authorities should be encouraged to support (financially and technically) this long-term asset protection, though limitations in de facto capacity in Afghanistan and other contexts are acknowledged.

154. **Resilience through operational innovation and flexibility:** The project demonstrated that strong working relationships can mitigate political disruption to some extent. When the government collapsed, the successful transition of government-contracted NTAs into extenders contracted through a third-party allowed coordination with the DfA to continue with minimal interruption. This confirmed that investing in human resources and flexible financing is a reliable approach for operational continuity during transition, surpassing reliance on formal (but potentially fragile) joint workplans.

155. **Sustaining community commitment requires a tiered support system:** The evaluation shows that the ideal of fully self-sufficient community O&M is fundamentally unachievable for high-cost infrastructure in low-income, volatile contexts. While communities exhibit strong ownership and successfully manage minor repairs and operational cost-recovery, this capacity is insufficient to ensure long-term sustainability and usability. The technical expertise gap (leading to system-eroding) and the capital expenditure gap for long-term component replacement means that, despite the successful local management, the programme is financially and technically unsustainable. Future programming must embed the understanding that local O&M success is conditional on the existence of a robust, technical support and financial security/mechanism. Sufficient technical training is also non-negotiable: future interventions must mandate and log the successful training of mechanics as a prerequisite for project closure.

156. **Prioritizing rapid repair chains over initial installation:** The effectiveness of SWS investments is degraded by frequent system breakdowns and excessive downtime. Nearly all O&M operators (82 per cent) reported at least one breakdown causing water not to be supplied at waterpoints, with the average outage lasting 55 days, a duration that fundamentally undermines system reliability and user trust. Institutional learning involves shifting the focus and resource from maximising initial system numbers to minimizing downtime through formalized, decentralized support. This requires exploring mechanisms to shorten maintenance response times such as establishing standardized, pre-funded regional maintenance contracts

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<sup>193</sup> The HHQ asked users for their opinion on whether their community would be able to maintain the system and keep it operating, to which 86% responded "Yes, definitely." The HHQ also asked users whether their household would be willing to pay a bit more or contribute more (in money or labour) in case their SWS needed to improve or sustain the water service, to which 80% responded that they would.

with guaranteed short-term response times, ensuring the systems remain functional and protect the community's investment and health.

157. **Addressing the 'availability gap' in solar water system design:** While the move to SWS provided a higher level of service and accessibility, effectiveness remains highly vulnerable to the critical dimension of availability. Less than half of users (42 per cent) reported water being available when needed, citing seasonal and weather-related impacts (cloudiness, rain) and subsequent days without access to water. This demonstrates an oversight in the technical design to account for predictable energy and resource fluctuation. The institutional lesson is that SWS models must be designed with greater resilience to predictable power and resource constraints, including the identification of sufficient storage capacity for longer outages or alternative power sources.

158. **Technical quality control must be systemic, not just standardized:** Establishing strong technical standards and protocols (like mandatory testing and approvals) is insufficient without systemic, enforced verification. The programme experienced widespread premature component failure (pumps, solar panels) and recurring safety issues (contamination risks) because resilience on paper-based approvals failed to ensure consistent quality execution and durability on the ground. Future efforts should balance the focus not only on defining quality, but also developing mandatory robust, verifiable controls, such as tracking the final resolution of all TPM deviations and enforcing strict material quality specifications to safeguard long-term asset value and prevent the installation of short lifespan components.

#### **EQ 7.2 What are lessons learned from UNICEF's management that could be used for continuation?**

159. **Community-level coordination and ownership as a foundation for success:** The evaluation identified community-level coordination and ownership as a cornerstone of project success. Stakeholders expressed strong trust in and ownership of CDCs/WUCs during initial phases. This early buy-in was essential for effective site selection, system acceptance, and perceived fairness of the intervention. Community commitment remained exceptionally high throughout implementation, with 86 per cent of respondents expressing confidence in their maintenance capacity and 80 per cent willing to contribute more (financially or in labour) if needed. This validates the effectiveness of involving community structures early in the process and demonstrates that communities are willing and capable partners when engaged appropriately from inception.

160. **Operational flexibility and strong partnerships enable continuity during political transitions:** SWS installation demonstrated that operational flexibility and strong human relationships are crucial for navigating political disruption. When the government collapsed in 2021, UNICEF's successful transition from government-contracted NTAs into extenders allowing coordination with the de facto authorities to continue with minimal interruption. This demonstrates that investing in human resources and flexible financing mechanisms provides more reliable operational continuity during transitions than reliance on formal joint workplans alone and represents a critical institutional capacity that should be preserved in future programming.

161. **Improved service delivery achieved high user satisfaction.** Solar water systems delivered a significantly higher level of service and accessibility compared to previous water sources, achieving high user satisfaction among communities that gained access. This improvement in service quality represents a fundamental success of the intervention model and demonstrates that, when systems function as designed, they meet critical community needs and generate strong user support. Community engagement from inception, flexible institutional arrangements, and improved service delivery, represent foundational strengths that future interventions should preserve and build upon.

162. **Adaptive donor relationships maintained programme relevance during political transition:** The programme successfully ensured its continued relevance to the changing national context by maintaining an effective and flexible relationship with its key donor, USAID, immediately following the political transition in 2021. USAID's willingness to broaden the programme scope and support adapted implementation modalities, including shifting to direct fund transfers to CDCs and scaling up partnerships with NGOs and the private sector, demonstrated a shared commitment to operational flexibility and context-responsiveness. This collegial donor relationship proved critical for maintaining programme relevance in a fluid environment and ensured that services could continue even when formal government structures were unstable, representing a key success factor in high-risk contexts that should be replicated in future programming.

163. **Strong quality assurance during construction improved technical standards:** UNICEF's utilisation of TPMs improved the effectiveness of quality assurance mechanisms during the construction phase, with established technical standards, protocols for mandatory testing and approvals, and systematic monitoring through Third-Party Monitoring providers. These quality control measures during installation represented a programmatic strength that helped ensure systems were built to specifications and met technical requirements at the point of handover, providing a solid foundation for subsequent operation and maintenance.

## 5.8 Cross-cutting Criteria

**To what extent have the solar-powered water supply systems in rural Afghanistan integrated gender, disability equity, human rights, the commitments to 'leave no one behind', climate, and environment and social safeguards?**

**Key findings:** UNICEF Afghanistan targeted vulnerable groups through household taps that improved women's safety and disability access, and solar water systems reduced risks and time burdens of water collection, supporting equity and LNOB objectives. However, inclusion effectiveness cannot be fully assessed with available evidence, and women's representation and decision-making roles remained limited and uneven, particularly post-2021. While climate relevance is strong given Afghanistan's drought conditions and high solar potential, limited post-installation monitoring, especially of groundwater extraction, constrains conclusions on long-term sustainability and resilience, underscoring the need for stronger safeguards follow-up. Overall, the programme demonstrated partial alignment with ESS, but more systematic post-construction monitoring is needed to sustain results and accountability over time.

**EQ 8.1: To what extent and how effectively has the programme integrated principles of gender, disability, equity, human rights and LNOB commitments?**

164. **The suitability of CDCs as mechanisms to represent women's needs was highly variable and context-dependent, with women's participation often occurring only indirectly through male intermediaries.** The extent to which CDCs can represent the needs of local stakeholders, including women and marginalized groups, is variable. CDCs were the primary delivery point for water supply systems prior to August 2021 (the DfA takeover) and following clarification between April 2022 until their dissolution in May 2024. Primary data revealed that women's representation in CDCs and the suitability of CDC as a mechanism to represent women's needs was varied and context dependent. KIIs with WASH stakeholders showed a broadly pragmatic approach in which it is felt that the design of water systems addresses women's needs by providing household taps, ensuring safely managed water at the premises. While direct public participation is not feasible, indirect methods are used to solicit women's needs through men or local Afghan community mobilizers and motivators who can discuss water safety and hygiene at the household level. Moreover, localized successes emerged in areas like Bamyan, where women demonstrated meaningful involvement in water governance, and some communities continued women's participation despite national restrictions. The programme's flexibility is evident in the 2025 modification of ActivityInfo to specifically log "train water user committees" with disaggregated data on men and women trained, demonstrating institutional learning and commitment to tracking gender integration.<sup>194</sup> Moving forward, the opportunity exists to build on these adaptive approaches while developing robust, context-sensitive monitoring tools from the design stage to systematically document and verify women's meaningful participation and influence on programming decisions.<sup>195</sup><sup>196</sup>

165. **Communities generally viewed governance structures as trustworthy and fair, with evident community engagement and ownership through CDCs, though variations in effectiveness are noted.** Document review shows a mixed picture of CDC inclusivity, with some assessments concluding CDCs played active roles in socio-economic development and the empowerment of women, while other evidence highlights structural constraints including poverty, elite capture, and cultural restrictions that limited meaningful participation of the most vulnerable.<sup>197</sup> Participants indicated influential figures continued to

<sup>194</sup> UNICEF Afghanistan. (n.d.). ActivityInfo Database Modifications 2025. Available at: UNICEF Sharepoint (Internal Documentation)

<sup>195</sup> UNICEF. (2017). UNICEF-Adapted UNEG Evaluation Reports Standards. Available at: <https://www.unicef.org/evaluation/media/816/file/UNICEF-Adapted-UNEG-Evaluation-Report-Standards.pdf>

<sup>196</sup> UNICEF. (2021). UNICEF Procedure for Ethical Standards in Research, Evaluation, Data Collection and Analysis. Available at: <https://www.unicef.org/media/91896/file/Procedure-Ethical-Standards.pdf>.

<sup>197</sup> UNICEF. (2024). Summative Evaluation of the ECHO Supported Humanitarian WASH Programme in Afghanistan (2022-2023). Available at: <https://evaluationreports.unicef.org/GetDocument?documentID=19993&fileID=54386>

receive priority access and interfere in decisions, with one noting "where there are poor people there is often a powerful person who intervenes and seizes control," making inclusion contingent on individual leaders and ad hoc permissions rather than guaranteed rights or formal representation. Trust in community governance for equitable implementation should not lead to overlook this varied effectiveness, the World Bank's Completion Report found that 50 per cent of rural CDC members were women with effective elite capture mitigation, though qualitative assessments emphasized the highly localized and variable nature of CDCs' ability to inclusively represent community needs, particularly regarding women's capacity to influence decisions.<sup>198</sup> UNICEF Afghanistan stakeholders noted that CDC dissolution may ultimately benefit equity and LNOB consideration given these structures were sometimes male and elite dominated.

166. **Solar water system interventions established solid foundations for equitable access while revealing clear opportunities for strengthening inclusion.** Evidence confirmed that solar systems provided particular benefits for people with disabilities by eliminating dangerous water collection journeys, demonstrating the intervention's potential to serve vulnerable populations. Stakeholders now have a valuable opportunity to strengthen inclusion by developing standardized mechanisms to identify and prioritize households with disabilities during system planning, ensuring equitable fee structures that protect the most vulnerable, and integrating disaggregated monitoring to verify that the most marginalized populations benefit systematically from interventions.

167. **Community-led planning advanced 'do no harm' in access while evaluation findings identified pathways for enhanced targeting.** Installation-related conflicts were largely avoided through effective community involvement in planning, particularly regarding tap and borehole locations, and positive social cohesion benefits emerged by reducing competition and tensions previously associated with accessing finite water resources. Women and children who previously faced hostility when collecting water from privately controlled sources no longer endured these negative social interactions.

168. **Important accountability mechanisms were established; evaluation findings identified opportunities to strengthen rights-based approaches.** UNICEF Afghanistan demonstrated strong technical quality assurance during construction phases and maintained effective donor relationships that enabled adaptive programming during political transition, ensuring continued service delivery even when formal government structures were unstable. The dissolution of CDCs, while disruptive, may create opportunities to address previous perceptions of male-and elite-dominated structures and to design more inclusive governance mechanisms. Moving forward, UNICEF Afghanistan and partners could build on this foundation by prioritizing robust feedback mechanisms that allow marginalized groups to raise concerns, developing verifiable monitoring tools to systematically capture how vulnerable populations shape interventions where appropriate, and ensuring that system design and fee structures explicitly protect the poorest households, transforming strong technical delivery into comprehensive rights-based programming that ensures accountability to LNOB principles. Therefore, human rights and LNOB principles were partially realized through accountability mechanisms, high user satisfaction, and community ownership, but exclusion from governance persisted.

## **EQ 8.2: To what extent and how effectively has the programme integrated climate and principles of environment and social safeguards?**

### **Analysis and design**

169. **UNICEF has made significant efforts to enhance the evidence base required to ensure water system investments are informed by appropriate analysis, although UNICEF Afghanistan did not explicitly articulate a climate rationale at the outset.** Early investments in solar systems were described in UNICEF Afghanistan reporting in terms of both their economic benefits (in terms of reduced fuel costs) and their alignment with UNICEF Afghanistan's efforts to decrease the carbon footprint of investments. A direct link between SWS and climate resilience was not explicit. However, over the evaluation timeframe, a focus on climate mitigation was developed. UNICEF Afghanistan's has contributed significantly to the evidence base in Afghanistan including production of the Climate Risk Analysis for the Water, Sanitation and Hygiene<sup>199</sup> and the ongoing development of a strategy to guide further development of the water resources monitoring system in

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<sup>198</sup> Rawadari. (2025). Afghanistan Human Rights Situation Report 2024. Available at: <https://rawadari.org/reports/afghanistan-human-rights-situation-report-2024/>

<sup>199</sup> UNICEF and SIWI. (2025). Climate Risk Analysis for the Water, Sanitation and Hygiene Sector in Afghanistan. Available at: <https://knowledge.unicef.org/wash/resource/climate-risk-analysis-water-sanitation-and-hygiene-sector-afghanistan>.

Afghanistan moving forward.<sup>200</sup> These efforts signify clear attention and efforts to strengthen the evidence base needed to ensure that systems are designed effectively and avoid negative impacts.

170. **The design and use of solar-powered systems to respond to Afghanistan’s specific climate conditions and challenges appear broadly relevant, though the absence of systematic risk assessments introduces risks and some purported benefits were not sufficiently evidenced.** While UNICEF Afghanistan did not explicitly articulate a climate rationale linking the current/anticipated climate change effects and the applicability of solar systems, annual reports highlight the water scarcity crisis that has lowered water tables, directly affecting the functionality of traditional hand pumps. Solar systems may be applicable to respond to the identified impacts by enabling access to deeper wells to sustain water access despite seasonal droughts and lowered water tables.<sup>201</sup> The applicability of using solar energy in Afghanistan’s climate, with over 320 sunny days per year is made explicit. However, the absence of activities for systematic monitoring of extraction rates introduces risks that deeper and higher capacity wells could over-extract the water table. Furthermore, while UNICEF Afghanistan reports that SWSs are “more sustainable” and “much more resilient” than hand pumps, the evidence base supporting these assertions is limited.<sup>202</sup> Some elements of the claim, such as the well-documented tendency for hand pumps to require more frequent repairs, are supported by global evidence and are reasonably transferable across contexts. Likewise, the general principle that deeper solar-powered boreholes can offer greater resilience to groundwater decline holds in many environments. However, in Afghanistan, limitations in groundwater monitoring and challenges with siting documentation constrain the ability to confirm whether solar systems are consistently more resilient than dug wells. For example, in areas where groundwater is stored in shallow weathered zones, dug wells may offer greater continuity of supply by storing limited seepage, an advantage that deeper boreholes do not provide.<sup>203</sup> Additionally, UNICEF Afghanistan did not include post-installation monitoring to assess community financial or technical capacity to manage and repair solar systems when failures do occur. Assertions of greater sustainability may therefore reflect short-term functionality, especially as many hand pumps installed prior to 2016 had minimal community O&M support. It remains unclear whether hand pumps would perform more sustainably under similar levels of community mobilisation and O&M support.<sup>204</sup>

## Implementation

171. **UNICEF Afghanistan has invested in strengthening the enabling environment for climate-resilient WASH services at the national and sub-national levels.** At the national level, prior to the DfA takeover, UNICEF Afghanistan worked with the government to develop climate informed policies, strategies, plans and programmes notably the Rural Water Supply Operation and Maintenance Strategy.<sup>205</sup> They have also delivered numerous technical trainings for MRRD/PRRD engineers on the design of solar-powered piped systems and Water Safety Planning alongside equipment support.<sup>206</sup> The results of these efforts had been notable with the MRRD water supply programming shifting from mainly boreholes with handpumps to predominantly constructing gravity-fed and solar powered piped systems by 2017.<sup>207</sup> Support to the enabling environment has continued through the work of extenders.<sup>208</sup> At the sub-national level, development of groundwater monitoring systems, included as an activity within funding proposals also funding rural water systems, has been essential in understanding water resource status and pressures and building long-term

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<sup>200</sup> UNICEF Afghanistan. (n.d.). Strategy for the Development of a Water Resources Monitoring System in Afghanistan (DRAFT). Available at: UNICEF Sharepoint (Internal Document)

<sup>201</sup> UNICEF and Global Water Partnership. (2017). Technical Brief: Linking Risk with Response: Options for Climate Resilient WASH. Available at: [https://www.gwp.org/globalassets/global/about-gwp/publications/unicef-gwp/gwp\\_unicef\\_linking\\_risk\\_with\\_response\\_brief.pdf](https://www.gwp.org/globalassets/global/about-gwp/publications/unicef-gwp/gwp_unicef_linking_risk_with_response_brief.pdf)

<sup>202</sup> UNICEF delivered a series of WASH field notes with relevant lessons learned. However, these are based on limited and unclear data sources. For instance, the lessons on O&M and revenue collection from metered water supply systems in based on a review of 16 water systems, 5 of which are solar water systems.

<sup>203</sup> UNICEF and Global Water Partnership. (2017). Technical Brief: Linking Risk with Response: Options for Climate Resilient WASH. Available at: [https://www.gwp.org/globalassets/global/about-gwp/publications/unicef-gwp/gwp\\_unicef\\_linking\\_risk\\_with\\_response\\_brief.pdf](https://www.gwp.org/globalassets/global/about-gwp/publications/unicef-gwp/gwp_unicef_linking_risk_with_response_brief.pdf)

<sup>204</sup> Comparisons of per-capita costs are presented comparing solar-powered and gravity-fed systems to boreholes with a hand pump showing higher initial costs. No data is presented on long-term sustainability in Afghanistan. Solar systems are characterized as more resilient in UNICEF, and Global Water Partnership. (2017). Technical Brief: Linking Risk with Response: Options for Climate Resilient WASH, based on a UNICEF-led assessment focused largely on Nigeria, Mauritania, Uganda and Myanmar including a desk review in Afghanistan.

<sup>205</sup> UNICEF Afghanistan. (2019). Annual WASH Report to Donors: (2019). Available at: UNICEF Sharepoint (Internal Document)

<sup>206</sup> UNICEF Afghanistan. (n.d.). Annual WASH Report to Donors: (2016); (2017); (2018); (2019); (2020). Available at: UNICEF Sharepoint (Internal Document)

<sup>207</sup> UNICEF Afghanistan. Annual WASH Report to Donors (2017). Available at: UNICEF Sharepoint (Internal Document)

<sup>208</sup> UNICEF Afghanistan. (2023). Annual WASH Report: (2021); (2023). Available at: UNICEF Sharepoint (Internal Document)

monitoring of systems.<sup>209</sup> Both restrictions on engagement with the DfA imposed by the international community, and the actions of the DfA themselves, curtail the success of these efforts.

172. **At the local level, UNICEF Afghanistan sought to increase access to climate resilient water services with increasing attention to climate resilient behavioural change and governance.** The benefits of solar systems as a viable option to scale up 'climate smart' services have long been lauded by UNICEF Afghanistan and other WASH actors.<sup>210</sup> Trainings provided to PRRD officials, CDCs and water management groups have strengthened local governance structures' capacity to implement resilient WASH programming. Additionally, scaling up the WSP implementation, piloted in 2017, has aimed to increase community awareness and capacity to respond to shocks and stresses.<sup>211</sup> Annual reports also highlight targeted events to extend local markets and supply chains to increase the availability of the skills and materials for climate-resilient water systems, including the solar panel supply chain and engagement of private associations of mechanics in the O&M of rural water supplies.<sup>212</sup> However, the absence of systematic post-construction monitoring, while aligned with the concept that these systems are fully handed over to communities, limits understanding of the continuous functionality of water points and resilience to the specific shocks experienced. As discussed in EQ3, this evaluation exercise highlights gaps in sustained water service provision.

### **Measuring and monitoring progress**

173. **UNICEF Afghanistan has increasingly tried to incorporate indicators to measure climate sensitivity.** Review of the combined output and outcome indicator reporting shows inclusion of new indicators to measure UNICEF Afghanistan WASH's shift towards more sustainable WASH practices, specifically related to this evaluation regarding the inclusion of a target for solar water systems. However, this indicator does not measure the resilience of these systems to climate change, nor do TPM reports effectively capture this.

174. **Environmental and Social Safeguards integration in solar water system implementation was partially in place, with significant attention to climate and environmental evidence-building but limited systematic risk management.**<sup>213</sup> UNICEF Afghanistan demonstrated strong commitment to strengthening the evidence base for climate-informed water investments through production of the Climate Risk Analysis for WASH<sup>214</sup> and ongoing development of water resource monitoring strategies, alongside national-level capacity building for climate-resilient programming including Water Safety Planning and technical training for engineers.<sup>215</sup> However, ESS implementation remained partially developed, as evidenced by the absence of systematic environmental risk assessments for groundwater sustainability; specifically, there was no monitoring of extraction rates to prevent aquifer depletion despite scaling deep boreholes that enable faster groundwater removal than traditional wells.<sup>216</sup> Social safeguards showed mixed results: while community mobilization and governance strengthening efforts increased local capacity for climate-resilient service delivery, the lack of post-installation monitoring meant that assertions of solar systems' greater sustainability and resilience compared to hand pumps were not sufficiently evidenced, particularly regarding communities' financial and technical capacity to manage repairs when failures occurred.<sup>217</sup> The absence of standardized climate sensitivity indicators in monitoring frameworks, combined with TPM reports that did not effectively capture system resilience to climate shocks, further constrained UNICEF's ability to verify whether environmental sustainability commitments were being achieved in practice.<sup>218</sup> These gaps highlight that while UNICEF Afghanistan made substantial progress in developing the enabling environment and evidence base for climate-resilient WASH, aligning with ESS principles on climate change (ESS 8), resource efficiency (ESS 2),

<sup>209</sup> UNICEF Afghanistan. (n.d.). Annual WASH Report to Donors: (2016); (2017); (2018); (2019); (2020). Available at: UNICEF Sharepoint (Internal Document)

<sup>210</sup> UNICEF and Global Water Partnership. (2017). Technical Brief: Linking Risk with Response: Options for Climate Resilient WASH. Available at: [https://www.gwp.org/globalassets/global/about-gwp/publications/unicef-gwp/gwp\\_unicef\\_linking\\_risk\\_with\\_response\\_brief.pdf](https://www.gwp.org/globalassets/global/about-gwp/publications/unicef-gwp/gwp_unicef_linking_risk_with_response_brief.pdf)

<sup>211</sup> According to annual reports WSPs were piloted in 32 communities in 2017, scaling up to 228 WSP committees in 2020 with 111 new communities targeted in 2021. The 2022 annual report did not specify the number of WSP's developed.

<sup>212</sup> UNICEF Afghanistan. (n.d.). Annual WASH Report to Donors: (2017); (2018); (2019). Available at: UNICEF Sharepoint (Internal Document)

<sup>213</sup> UNICEF Afghanistan. (2024). Summative Evaluation of the ECHO-supported WASH Programme Implementation: 2022-2023. Available at: <https://evaluationreports.unicef.org/GetDocument?documentID=19993&fileID=54386>.

<sup>214</sup> UNICEF Afghanistan (n.d.). Climate Risk Analysis for Water, Sanitation and Hygiene Sector in Afghanistan. Available at:

<sup>215</sup> UNICEF Afghanistan and MMRD. (2019). Rural Water Supply Operation and Maintenance Strategy. Available at: UNICEF Sharepoint (not publicly available)

<sup>216</sup> UNICEF Afghanistan. (2024). ECHO-supported WASH Programme Implementation. Available at: <https://evaluationreports.unicef.org/GetDocument?documentID=19993&fileID=54386>

<sup>217</sup> Ibid.

<sup>218</sup> Ibid.

and community health and safety (ESS 3),<sup>219</sup> systematic operationalization of environmental risk management and post-construction safeguards monitoring remained critical areas requiring strengthening to ensure long-term sustainability and accountability to ESS commitments.<sup>220</sup>

## 6 CONCLUSIONS

175. **Relevance:** UNICEF Afghanistan's installation of SWSs was highly relevant at the strategic level, aligning with UNICEF's organizational commitment to renewable energy and higher-level service provision, national water supply objectives outlined in the Rural Water Supply Operation and Maintenance Strategy (2020-2030), and SDG 6.1 targets for safely managed drinking water services. The programme demonstrated strong adaptability throughout the evaluation's temporal scope (2016–2024), successfully revising implementation strategies in response to major contextual shifts, including reduced space for women's engagement following the 2021 political transition, changes in community governance structures culminating in CDC dissolution in May 2024, and large-scale population displacement straining system capacity. Participatory approaches remained central to design relevance, with 93 per cent of O&M personal reporting that meetings were held prior to installation and 86 per cent of users expressing "full" satisfaction with their level of involvement. Community involvement was particularly critical for site selection activities for tap and borehole locations. However, at the implementation level, the programme's relevance was somewhat undermined by several factors, especially CDC dissolution disrupting established coordination pathways, accelerating groundwater decline, and population growth, especially due to large returnee populations, increasingly straining system capacity beyond original design specifications.

176. **Effectiveness:** UNICEF Afghanistan made notable progress toward improving access to functional water through solar-powered systems. Key achievements included strategic transition from fossil-fuel infrastructure to renewable energy and advancement toward higher service levels, with household connections rising from 53 per cent in 2016 to 92 per cent in 2024. Water successfully reached vulnerable communities including previously inaccessible areas, demonstrating expanded geographic coverage and marginalized population reach. Strong community ownership was evident through routine maintenance management (55 per cent assigned mechanics) and financial commitment via tariff compliance (62 per cent of users reporting any regular found fees "easily affordable") despite severe economic constraints. The shift toward higher service levels, especially household-level connections, improved accessibility, and SWSs were the main source of drinking water for 87 per cent of users, demonstrating strong effectiveness in meeting essential drinking needs. However, overall effectiveness was constrained by frequent system breakdowns, long repair times, limited daily and seasonal availability, and insufficient water quantities to meet broader household needs, particularly in areas with older systems. Despite these limitations, user satisfaction remained high (76 per cent "completely satisfied"), underscoring the significant value of reliable drinking water access in a highly constrained setting.

177. **Sustainability:** Overall, solar-powered and piped water supply systems in Afghanistan demonstrate sustainability, with 75 per cent of systems still functional which is a significant achievement in a highly fragile, conflict- and climate-affected context. This level of functionality reflects strong community ownership and commitment, with most communities able to manage routine operations and minor repairs. However, sustainability declines over time, as older systems show pronounced degradation and higher failure rates due to limited technical capacity, inadequate financing for major component replacement, and growing climate stress, particularly drought and groundwater decline. While climate-resilient measures such as Water Safety Plans and solar energy use are increasingly integrated, gaps in risk assessments, reservoir capacity, post-installation monitoring, and standardized handover and governance processes constrain long-term performance. Taken together, the findings suggest that current systems can sustain service in the short to medium term, but long-term sustainability will depend on stronger external technical backstopping, predictable financing for major repairs, more consistent governance and handover processes, and deeper integration of climate resilience and water resource management.

178. **Contribution/Impact:** Solar water systems produced substantial positive contributions to health, well-being, and safety where systems remained functional. Health improvements were widely reported by the vast majority of the users, attributed to cleaner water reducing waterborne disease exposure and physical

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<sup>219</sup> UNICEF. (2023). Baseline Assessment of Environmental and Social Safeguards (ESS) Implementation in UNICEF. Available at: <https://evaluationreports.unicef.org/GetDocument?documentID=19393&fileID=52602>.

<sup>220</sup> UNICEF Afghanistan. (2024). ECHO-supported WASH Programme Implementation. Available at: <https://evaluationreports.unicef.org/GetDocument?documentID=19993&fileID=54386>

injuries from water collection. Safety improvements were pronounced (most users reported increased protection from harassment), eliminating humiliation and hostility women and children previously endured at privately controlled sources. Economic impacts included major time savings for a large majority, enabling domestic responsibilities and limited income-generating activities, plus reduced water costs for more than half of households, freeing household resources, critical benefits given extreme poverty. Social cohesion improved through reduced competition over finite resources, with community involvement in planning successfully preventing installation-related conflicts. Environmental impacts presented a mixed picture: universal solar adoption reduced greenhouse gas emissions, particularly replacing diesel generators, yet these gains were offset by accelerated groundwater extraction from deep boreholes enabling faster removal than traditional wells without adequate monitoring or recharge interventions, contributing to declining water tables.

179. **Coherence & Coordination:** UNICEF Afghanistan's coordination, coherence, and collaboration with key stakeholders demonstrated strategic effectiveness during planning and construction phases, with strong community-level coordination and successful adaptation to political transition maintaining operational continuity. Community-level stakeholders reported positive coordination between water governance structures and community members, while jointly established rolling workplans with MRRD prior to government collapse contributed to effective collaboration. UNICEF Afghanistan's strategic transition of NTAs to extender roles following the political transition enabled continued coordination with minimal disruption. Coordination with key donors, particularly USAID, demonstrated strong collaboration through collegial relationships supporting programmatic adaptations including the shift to direct CDC fund transfers, scaled NGO partnerships, and private contractor implementation. UNICEF Afghanistan's WASH section demonstrated flexibility integrating piecemeal funding from diverse sources with varying conditionalities, while participation in the AWAP enabled broader water sector coordination. However, coordination effectiveness faced significant challenges post-installation. There were also challenges within sector-level mechanisms, particularly following the government transition. While communities could reach external support providers, a third of respondents reported never receiving requested support despite making contact. Most stakeholders were negative about the impact of CDC dissolution on coordination as established communication pathways were disrupted, though some communities reported improvements by removing ineffective intermediaries.

180. **Efficiency:** UNICEF Afghanistan demonstrated strong financial efficiency through strategic partnership choices and adaptive implementation. Implementation through CDCs as primary partners generally enabled cost savings versus NGO implementation (average construction costs USD 36-43 per capita, rehabilitation USD 11-15 per capita), an intentional strategy to maximize cost-efficiency through systems strengthening. Strong performance under donor agreements achieved high expenditure rates for USAID and realized lower actual per capita costs than projected, with savings reinvested to expand reach from 525,000 to 811,345 people reached with improved drinking water access. Despite recurrent delays from approval processes, winter weather halting construction, and the 2021 government collapse disrupting security and supply chains, UNICEF Afghanistan generally exceeded drinking water provision targets. Efficiency was constrained by monitoring limitations and rising post-transition costs. Economic chaos following political transition raised implementation costs through high inflation and supply chain disruptions, with NGO implementation becoming more competitive with CDC costs by 2024. Monitoring improvements during construction remained incomplete, with some corrective actions unaddressed.

181. **Cross-cutting areas:** UNICEF Afghanistan demonstrated adaptive and context-sensitive programming amid significant constraints, achieving tangible gains while revealing important gaps. Gender integration efforts improved women's safety and access, particularly through household water connections, but did not translate into meaningful participation in governance or decision-making. Equity outcomes were generally strong at community level, with broad coverage and reduced tensions, yet disability inclusion, reach to displaced populations, and protection of the most vulnerable were insufficiently systematic. Human rights and LNOB principles were partially realized through accountability mechanisms, high user satisfaction, and community ownership, but exclusion from governance persisted. Climate-responsive programming advanced through solar-powered systems, risk analyses, and capacity building, though limited post-installation monitoring and groundwater extraction oversight constrained verification of long-term sustainability. Overall, while technical delivery and adaptive management were strong, greater institutionalization of gender, disability, rights-based approaches, and environmental and social safeguards, supported by disaggregated monitoring and post-implementation follow-up where feasible, would be required to verify equitable, resilient, and sustainable outcomes.

## 7 RECOMMENDATIONS

182. The following recommendations are derived from conclusions that flow from the evaluation findings. Recommendations are presented in priority order based on ET judgment. These recommendations are drawn from triangulating key suggestions provided by respondents during primary data collection, considering operational and contextual challenges in Afghanistan, and corroborating with programme documents. Recommendations were also informed by the preliminary findings presentation to the Evaluation Reference Group in December 2025.

#	Recommendation & Action Points	Priority/time frame	Responsibility
1	<p><b>Establish sustainable financing mechanisms for community water systems maintenance and strengthen direct community engagement</b></p> <ul style="list-style-type: none"> <li>• Develop and roll out standardized, context-appropriate operation and maintenance financing models for solar water systems, including clear tariff guidance, contingency arrangements for major repairs, and transparent community-level financial management.</li> <li>• Review available mechanisms for contacting communities directly post CDC dissolution and identify and pilot mechanisms for direct community engagement post-CDC dissolution.</li> <li>• Budget for regular capital maintenance for systems (especially pump replacement).</li> <li>• Use evaluation evidence to proactively engage donors on the need for increased, multi-year, and flexible WASH funding, emphasizing that sustained financing is critical to safeguard existing solar water investments, address climate and groundwater risks, and maintain service continuity rather than focusing only on new infrastructure expansion.</li> </ul>	<p><b>High/immediate</b> (6 months – 1 year)</p>	<p>UNICEF Afghanistan WASH UNICEF Afghanistan Resource Mobilization</p>
2	<p><b>Enhance the climate resilience of existing infrastructure and more systematically strengthen climate resilience of future investments.</b></p> <ul style="list-style-type: none"> <li>• Ensure water supply operators have sufficient training to monitor extraction rates and continue efforts to focus on climate resilience in water safety planning.</li> <li>• Evaluate and refine the process for siting borehole locations to improve site productivity/sustainability.</li> <li>• Ensure drilling is to an adequate diameter and depth bearing in mind seasonal and inter-seasonal variations.</li> <li>• Develop contingency plans to identify supplementary and/or backup sources and storage.</li> <li>• Explore the feasibility to integrate water recharge efforts or coordinating with better-placed actors to ensure complementary recharge efforts alongside extraction systems</li> <li>• Conduct rapid climate and groundwater vulnerability screenings of existing solar water systems in drought-and flood-prone areas to identify priority sites for upgrades, including reservoir expansion, pipe protection, and flood mitigation measures.</li> </ul>	<p><b>High/immediate</b> (1-2 years)</p>	<p>UNICEF Afghanistan WASH</p>

	<ul style="list-style-type: none"> <li>Institutionalize mandatory hydrogeological and climate risk assessments at the design stage of all new water systems, with minimum standards for reservoir capacity and site selection adjusted for projected climate variability.</li> </ul>		
3	<p><b>Establish and maintain minimum community preparedness standards for sustainable O&amp;M</b></p> <ul style="list-style-type: none"> <li>Define and roll out a capacity assessment toolkit, establishing minimum standards (training, operating capital, and the like).</li> <li>Institutionalize mandatory training and refresher sessions on routine maintenance, fault reporting, and basic financial management for Water User Committees and mechanics.</li> <li>Introduce differentiated financing models for water system O&amp;M, ranging from standard to subsidized and fully subsidized, based on community vulnerability, alongside a systematic assessment of all new and existing systems to identify priority support needs.</li> <li>Strengthen operational readiness by training maintenance workers and providing toolkits, piloting and scaling centralized spare-parts depots, and establishing an emergency financing mechanism to enable rapid response to major system failures.</li> </ul>	<b>High/immediate</b> (1-2 years)	UNICEF Afghanistan WASH
4	<p><b>Continue to strengthen women’s meaningful participation through gender-responsive engagement and institutionalize equity, disability, human rights, and LNOB commitments</b></p> <ul style="list-style-type: none"> <li>Develop gender-responsive engagement toolkit with culturally appropriate strategies.</li> <li>Produce and distribute illustrated safe water handling guides in Dari and Pashto.</li> <li>Leverage mahram arrangements and engage community elders/religious leaders to facilitate women's participation.</li> <li>Move beyond design-level inclusion by embedding adaptive engagement approaches that capture women’s, marginalized groups’, people with disabilities, and displaced populations’ needs more directly incorporating verifiable, disaggregated monitoring tools when contextually feasible.</li> <li>Integrate disaggregated data collection (sex, disability, vulnerability) into existing TPM and monitoring protocols.</li> <li>Add inclusion questions to quarterly monitoring tools assessing women's information access, accessibility, fee exemptions, and participation barriers.</li> <li>Document women's consultation through culturally appropriate mechanisms in existing community entry processes with evidence of feedback integration. Include inclusion verification points in existing TPM quality assurance checklists.</li> <li>Conduct annual desk-based equity analysis using compiled monitoring data to identify exclusion patterns with targeted corrective actions.</li> </ul>	<b>High/immediate</b> (6 months – 1 year)	UNICEF Afghanistan WASH UNICEF Afghanistan Gender and SBC sections
5	<p><b>Sustain UNICEF Afghanistan’s contribution to integrated water resource management efforts in the country</b></p>	<b>High/immediate</b> (1-2 years)	UNICEF Afghanistan WASH

	<ul style="list-style-type: none"> <li>● Maintain active UNICEF Afghanistan membership and participation in AWAP and the WSG and contribute technical data from UNICEF Afghanistan-supported systems to groundwater monitoring efforts.</li> <li>● Identify and secure long-term funding partnerships for groundwater monitoring stations.</li> <li>● Advocate for integration of community-level extraction data into national water resource planning.</li> <li>● Develop exit strategy ensuring monitoring station sustainability beyond UNICEF Afghanistan funding.</li> </ul>		UNICEF Afghanistan Resource mobilization
6	<p><b>Strengthen monitoring, information management, and learning systems</b></p> <ul style="list-style-type: none"> <li>● Strengthen third-party monitoring by developing enhanced quality assurance protocols that integrate explicit climate-resilience verification and standardized indicators across all zones and partners.</li> <li>● Pilot and finalize revised TPM reporting formats alongside a centralized information management system, including digitization of historical documentation, to improve data consistency, usability, and learning.</li> <li>● Roll out the enhanced protocols and system at scale, institutionalize regular learning and feedback sessions, and produce concise evidence briefs to track trends, measure quality improvements over time, and inform adaptive programme decisions.</li> </ul>	<b>High/immediate</b> (6 months – 1 year)	UNICEF Afghanistan WASH UNICEF Afghanistan PMD

## 8 ANNEXES

Please refer to the separate document. The list of annexes is reflected below.

- Annex 1. ToR
- Annex 2. Evaluation matrix
- Annex 3. Additional context and evaluation object details
- Annex 4. Retrospective ToC
- Annex 5. Further detail on evaluation purpose, objective and scope
- Annex 6. Data collection tools and further methodological details
- Annex 7. Recognition of Community voices
- Annex 8. Bibliography
- Annex 9. Additional details on quality assurance
- Annex 10. Ethical Review Approval
- Annex 11. Inception report
- Annex 12. List of stakeholders interviewed