Research Terms of Reference

Winter - Cold Spot and Settlement Isolation Analysis

AFG2501

Afghanistan

March 2025

V1

REACH Informing more effective humanitarian action

1. Executive Summary

Country of intervention	*Afghanistan*					
Type of Emergency	X	Natural hazards	□	Conflict	□	Other *(specify)*
Type of Crisis	X	Sudden onset	□	Slow onset	□	Protracted
Mandating Body/ Agency	*WFP*					
IMPACT Project Code	*NA: Will be defined later*					
Overall Research Timeframe *(from research design to final outputs / M&E)*	15/03/2025 to 30/12/2025					
Research Timeframe	1. Start data consolidation: 10/05/2025		4. Outputs sent for validation: 30/09/2025			
	2. Preliminary source list (inc. reliability scale) sent for validation: 09/05/2025		5. Outputs published: 30/09/2025			
	3. Preliminary presentation: 30/06/2025		6. Final presentation: 30/09/2025			
Number of assessments	X	Single assessment (one cycle)				
	□	Multi assessment (more than one cycle)				

		[Describe here the frequency of the cycle]		
Humanitarian milestones	**Milestone**		**Deadline (can be tentative)**	
	X	Donor plan/strategy	30/12/2025	
	□	Inter-cluster plan/strategy	_ _/_ _/_ _ _ _	
	□	Cluster plan/strategy	_ _/_ _/_ _ _ _	
	□	NGO platform plan/strategy	_ _/_ _/_ _ _ _	
	□	Other (Specify):	_ _/_ _/_ _ _ _	
Audience Type & Dissemination *Specify **who** will the assessment inform and **how** you will disseminate to inform the audience*	**Audience type**		**Dissemination**	
	□ Strategic X Programmatic X Operational □ [Other, Specify]		□ General Product Mailing (e.g. mail to NGO consortium; HCT participants; Donors) □ Cluster Mailing (Education, Shelter and WASH) and presentation of findings at next cluster meeting □ Presentation of findings (e.g. at HCT meeting; Cluster meeting) □ Website Dissemination (Relief Web & REACH Resource Centre) □ [Other, Specify]	
Stakeholder mapping *Has a detailed stakeholder mapping been conducted during research design to identify all actors that could **contribute** to and/or **benefit from** the research?*	□	Yes	X	No
General Objective	This research aims to identify communities in Afghanistan at risk of winter cold spots (cold waves/lower temperatures) and settlement isolation due to heavy snowfall. The findings will support WFP and other humanitarian actors in winterization response planning, enabling informed decision-making to prioritize assistance for vulnerable populations during extreme winter conditions.			
Specific Objective(s)	• To assess the risk of cold waves/unusually low temperatures in relation to existing vulnerabilities within communities. • To identify the impact of settlement isolation on community livelihoods, food access, and access to basic services			

<table>
<tr><td></td><td colspan="4">To identify patterns and trends of cold waves and heavy snowfall in Afghanistan.
To map and identify hotspot areas where communities are most vulnerable to winter shocks due to factors such as geographic isolation, poor infrastructure, and limited access to resources
To define a set of cold wave indicators and thresholds that can be used to monitor and measure the severity of winter shocks.</td></tr>
<tr><td>Research Questions</td><td colspan="4">Cold Spot Analysis:
Which communities are prone to coldwave / unusual lowering temperature?
How will existing vulnerabilities likely be most influenced by compounding impacts of winter-related climate conditions?
Which communities are at highest risk to become potential ‘Cold Spots’ and will potentially face increased needs during the upcoming winters?
What indicators and data sets can be used to effectively measure the severity and duration of cold waves in Afghanistan?
What enviromental factor like Lanina influence coldwave/lower temperature conditions in Afghanistan?
Settlement Isoaltion Analysis:
Which communities are exposed to settlement isoaltion during the winter months?
What strategies do communities acquire to access food during harsh winter times?
How does isolation impact communities in accessing health centers, markets, and educational centers?</td></tr>
<tr><td>Geographic Coverage</td><td colspan="4">Nationwide</td></tr>
<tr><td>Secondary data sources</td><td colspan="4">REACH – AFG -Humanitarian situation Monitoring
REACH – AFG – Shock Monitoring Index (SMI)
REACH – AFG -Joint Market Monitoring Initiative
REACH – UKR – Winterization – Cold Spot Risk Assessment
WFP – Vulnerability Analysis and Mapping (VAM)
ECMWF / Copernicus Climate Change Service – Daily temperature
FAO. 2023. Afghanistan: Cold wave assessment on livestock – Data in Emergencies Impact report, July 2023. Rome. https://doi.org/10.4060/cc7193en
NASA SRTM Digital Elevation 30m
REACH – BSU Boundaries
OSM- Road Network
News Sources
Humanitarian Publication and Academic Articles</td></tr>
<tr><td rowspan="3">Disaggregation by gender and age
Are you planning to conduct sex/age</td><td colspan="2">Gender</td><td colspan="2">Age</td></tr>
<tr><td>□</td><td>Yes</td><td>□</td><td>Yes</td></tr>
<tr><td>X</td><td>No</td><td>X</td><td>No</td></tr>
</table>

disaggregated analysis?						
Expected ouput type(s)	X	Situation overview #: _ _	□	Report #: _ _	□	Profile #: _ _
	□	Presentation (Preliminary findings) #: _ _	X	Presentation (Final) #: _ _	□	Factsheet #: _ _
	□	Interactive dashboard #:_	□	Webmap #: _ _	X	Map #: _ _
	□	[Other, Specify] #: _ _				
Access	X	Public (available on REACH resource center and other humanitarian platforms)				
	□	Restricted (bilateral dissemination only upon agreed dissemination list, no publication on REACH or other platforms)				
Visibility	***REACH***					
	Donor: *WFP*					
	Coordination Framework:					
	Partners:					

2. Rationale

2.1 Background

Afghanistan, where 75% of the terrain is mountainous and the climate is semi-arid continental, experiences cold winters accompanied by heavy snowfall and cold waves. These conditions, combined with challenges such as underdeveloped road networks, lack of basic services, households' weak economic conditions, and the government's limited capacity to provide adequate services, increase the vulnerability of exposed communities to winter shocks. In 2023, according to media reports, approximately 160 people died due to cold weather, and between 70,000 and 200,000 livestock were lost during this period.[1] Available reports and studies show that cold waves and settlement isolation continue to exacerbate livelihoods, food access, access to basic services, and shelter destruction, while also posing significant threats to lives in affected communities.[2]

To provide information on communities vulnerable to winter shocks (cold waves and settlement isolation) in Afghanistan, REACH and WFP will conduct a secondary data review of available datasets

[1] **FAO Afghanistan Coldwave Assessment** - https://reliefweb.int/report/afghanistan/afghanistan-cold-wave-assessment-livestock-data-emergencies-impact-report-july-2023

[2] Sources: European Union Copernicus Sentinel 3 , REF/RL - Extreme Weather After Mild Winter Kills Dozens In Afghanistan And Pakistan , Afghanistan IPC Acute Food Security Analysis September 2024 - March 2025," January 2025

dating back to 2000, including remote sensing climate data, secondary data, and products from other organizations, as well as academic sources.

2.2 Intended impact

The outcome of this study will strengthen WFP's early warning system by providing insights to better define hotspot locations for winterisation needs and improve response planning. Additionally, the findings will help define a set of indicators and thresholds for measuring cold waves and settlement isolation in Afghanistan, which can support future studies and winter shock monitoring systems.

3. Methodology

This study utilizes available datasets, reports, research papers, and news sources related to winter shocks, food security, livelihoods, and access to services. In the first step, all secondary data sources will be identified. Next, the relationships between winter shocks and their potential outcomes will be examined using outputs produced by humanitarian actors, academic research papers, and news sources. Once the interactions of winter shocks (e.g., cold waves, settlement isolation) with possible outcomes are established, further analysis will be conducted.

This study aims to assess two common winter shocks: cold waves/lower temperatures and settlement isolation. Each shock will be analyzed separately.

a) Cold Spot Analysis

This analysis evaluates the risk of cold waves and unusual low temperatures for communities, based on UNDRR's risk model. According to this framework, risk is a function of:[3]

- Hazard (severity of cold temperatures),
- Exposure (communities affected)
- Vulnerability (comprising susceptibility and lack of coping capacity (LOCC)).

Risk = Hazard x Exposure X Vulnerability (Susceptibility + Lack of Coping Capacity)

Details about indicators for each element of this model is provided at the end of this document in the DAP.

The goal is to identify "Cold Spots" areas with the highest compounded impacts of winter hazards and vulnerabilities. The analysis follows these steps:

- Datasets and indicators are defined for each risk component (Hazard, Exposure, Susceptibility, LOCC).
- All data is aggregated at the community level for analysis.
- Classify the data in scale of 1 – 5.

[3] UNDRR : Hazard | Understanding Disaster Risk

- Calculate the mean of the group classes in order to identify the Cold Spot Index-Class which indicates the 'Cold Spots'.
- Create the outputs including mapping of the cold spots, and situation brief which includes research findings.

b) Settlement Isolation Analysis

This analysis will be carried out to assess the **severity of communities' exposure to isolation** due to snowfall, including its impact on:

- Access to food,
- Transportation,
- Access to health centers, markets, and education centers.

Process of the Analysis:

i. Dataset and indicator selection:
   - Includes remote sensing data (ERA5 daily snow depth),
   - REACH Humanitarian Situation Monitoring (HSM) data,
   - REACH Joint Market Monitoring Initiative (JMMI) data,
   - Community boundary shapefiles.

ii. Defining exposed communities:
   - Based on a historical settlement isolation study (since 2000).

iii. Impact assessment:
   - Evaluates food access challenges,
   - Transportation barriers,
   - Access to critical services (health, markets, education).

iv. Analysis outputs:
   - Results will be integrated, mapped, and visualized,
   - Key findings will be summarized in a separate situational brief.

3.1 Analysis Unit

The unit of analysis for this study will be community boundaries, known as Basic Service Units (BSUs). These boundaries were mapped by REACH Afghanistan in 2021. Additionally, district boundaries provided by OCHA will also be used for some analyses.

3.2 Population of interest

The geographic scope of this study is whole of Afghanistan boundary, with more focused-on areas which historical climate data analysis will find them exposed to winter shocks. The analysis unit will be either Communities boundaries or the districts (admin2) boundaries. There is no disaggregation based on the population groups.

3.3 Secondary data review

This study is based on secondary sources, including datasets produced by REACH and other sources. The primary data source for this study is the REACH Quarterly Humanitarian Situation Monitoring

(HSM), which is collected at the community key informant level. In HSM rounds 9 and 10, conducted in Q4 2024 and Q1 2025, a set of questions related to winter shocks such as cold waves and settlement isolation were added to the tool. These questions were designed to enhance our understanding of community exposure to these shocks and their impacts. Additionally, the Joint Market Monitoring Initiative (JMMI) provides monthly key informant-level data about food and non-food item prices across a number of districts. This data can help enhance the analysis of the impact of winter shocks on item prices in the market and food accessibility. Datasets from other sources, including remote sensing and data collected by other actors in Afghanistan, will also be used to fill data gaps and extend the timeframe and scope of the analysis.

DATA	SOURCE	Data Collection Method	Availability
HSM	REACH	Quarterly – KI level	2021 - Now
JMMI	Joint Monitoring	Monthly – KI level	2021 - Now
VAM	WFP	Monthly – KI level	2011 - Now
DIEM	FAO	Quarterly – HH level	2021 - Now
DEM	SRTM	Remote Sensing	2000- Now
Daily Temperature	Era5	Remote Sensing	1950 - Now
Daily Snow Depth	Era5	Remote Sensing	1950 - Now
Road network	OSM	Community of Mappers / Remote sensing	2004

3.4 Limitations

Key Limitations

- HSM is one of the main data sources in this study. In addition, JMMI data will be used to monitor the impact of winter shocks on item prices. Both datasets are collected at the key informant level, which may introduce biases. Furthermore, news sources and anecdotal evidence will be considered for triangulation; however, the accuracy of these sources is not well confirmed.
- Remote sensing data is the only source for measuring temperature and snow depth. As a result, this data may lack precision, which could affect the analysis outcomes.
- For trend analysis of winter shock patterns, historical data on affected populations, locations, and the extent of losses is required. However, in Afghanistan, no regular data collection has been conducted in this regard. Consequently, data from winter shocks in earlier years is unavailable, limiting a deeper study of the impacts of winter shocks in Afghanistan.

4. Key ethical considerations and related risks

The proposed research design meets / does not meet the following criteria:

The proposed research design…	***Yes/ No***	***Details if no (including mitigation)***
… Has been coordinated with relevant stakeholders to **avoid unnecessary duplication** of data collection efforts?	Yes	
… Does not **expose researchers and / or data subjects to any risks as a direct result** of this research and analysis exercise?	Yes	
… Does not involve **analysing information on specific topics which may be stressful and/ or re-traumatising** for researchers and/or data subjects?	Yes	
… Follows IMPACT SOPs for management of **personally identifiable information**?	Yes	

5. Roles and responsibilities

Task Description	***Responsible***	***Accountable***	***Consulted***	***Informed***
Research design	*Assessment Specialist*	*Assessment Specialist*	*RM, Data Analyst*	*IMPACT HQ*
Data processing and analysis	Data Analyst	Data specialist	Assessment Specialist	IMPACT HQ
Output production	Assessment specialist	Assessment specialist	RM, HQ	*WFP*
Dissemination	Assessment Specialist	DCC	IMPACT HQ Research Department	WFP, Clusters
Monitoring & Evaluation	Assessment specialist	PDA	PDA	DCC
Lessons learned	Assessment Specialist	Assessment specialist	Data specialist/RM/WFP	DCC

6. Data Analysis Plan

Cold Spot Analysis Data Analysis Plan:

No	Risk Components	Research Questions/Indicators	Indicators	Sources
1	Hazard	Which communities have been exposed to cold waves/lower temperatures since 2000?	Number of extreme cold events occurrence since 2000	Era5
2			Number of high cold events occurrence since 2000	Era5
3			Number of moderate cold events occurrence since 2000	Era5
4	Exposure	What number of population have experienced lower temperatures/cold waves, and at what severity levels?	Community level population based on world pop 2020	World pop
5		What are the main types of livestock kept by households in exposed communities?	proportion of sheep out of the total livestock in the community	HSM
6			proportion of goat out of the total livestock in the community	HSM
7			proportion of cow out of the total livestock in the community	HSM
8			proportion of donkey out of the total livestock in the community	HSM
9			proportion of chicken out of the total livestock in the community	HSM
10	Susceptibility	What is the main livelihood type in the exposed communities?	Fews Net Livelihood Zones 2011	Fews net
11		What has been the food stability status in these communities over the last 10 years?	IPC trend in the last 10 years.	IPC (2014 - 2024)
12			Seasonal variation in food basket price	JMMI
13	Lack of coping capacity	How naturally isolated are these communities?	Digital elevation model, slop and Ruggedness, distance to road	Geospatial Analysis
14		What are the main types of livestock shelters used in the community?	How are livestock normally kept during the cold season?	HSM

15		Are veterinary services available to the community?	% of settlements where KIs reported unavailability of veterinary services as main reason of losing livestock.	HSM

Settlement Isolation Data Analysis Plan:

No	Research Questions/Indicators	Indicators	Sources
1	Which communities have been experienced heavy snowfall which likely caused settlement isolation since 2000?	Number of very heavy snow fall occurrence since 2000	Era5
2		Number of high snowfall since 2000	Era5
3		Number of moderate snowfall occurrence since 2000	Era5
4	What is the average duration of snow cover in the settlement?	Snow cover duration (days)	Era5
5	What number of populations have been exposed to heavy snow fall, and at what severity levels?	Community level population based on world pop 2020	World pop
6	In the exposed communities what is households' main strategy to access the food during the winter.	Own production during the winter	
7		Purchase food from market	
8		Indoor-stored food from pre-winter or harvest time	HSM
9	How food Items price increased during the winter in the exposed communities?	Market Trends	JMMI
10		% of settlements where KIs reported an increase in food items prices during the winter.	HSM
11	How exposed communities are naturally isolated?	Digital elevation model, slop and Ruggedness, distance to road	Geospatial Analysis
12	How usual transportation affected during the winter in the exposed communities?	% of settlements where KIs reported movement challenges are present in their settlements	HSM
13		% of settlements where KIs reported usually carry good to their settlements during the winter	HSM
14		% of settlements where KIs reported how far can hhs reasonably travel during the winter	HSM

7. Data Management Plan

Data protection risk assessment		
Have you completed the Indicators Risk Assessment table below?	□ Yes	□ No, no information that potentially allows identification of individuals is to be collected.
	[Please complete the first 4 columns in the Indicators Risk Assessment table below]	

Risk indicator (including direct and indirect identifiers)	Type of identification risk	Disclosure implications	Benefits	**Class**	**Required mitigation**
[Specify indicator, e.g. KI_phone number]	*[Specify identification risk, e.g. Direct contact/identification of KI]*	*[Specify implications, e.g. loss of privacy/potential target of armed actors]*	*[Specify benefits, e.g. follow up for data cleaning]*	*[To be completed by IMPACT HQ]*	*[To be specified by IMPACT HQ]*
[Add relevant number of rows for risk indicators]					

8. Monitoring & Evaluation Plan

IMPACT Objective	**External M&E Indicator**	**Internal M&E Indicator**	**Focal point**	**Tool**	**Will indicator be tracked?**
Humanitarian stakeholders are accessing IMPACT products	Number of humanitarian organisations accessing IMPACT services/products Number of individuals accessing IMPACT services/products	# of downloads of x product from Resource Center	Country request to HQ	User_log	□ Yes
		# of downloads of x product from Relief Web	Country request to HQ		□ Yes
		# of downloads of x product from Country level platforms	Country team		□ Yes

		# of page clicks on x product from REACH global newsletter	Country request to HQ		□ Yes
		# of page clicks on x product from country newsletter, sendingBlue, bit.ly	Country team		□ Yes
		# of visits to x webmap/x dashboard	Country request to HQ		□ Yes
IMPACT activities contribute to better program implementation and coordination of the humanitarian response	Number of humanitarian organisations utilizing IMPACT services/products	# references in HPC documents (HNO, SRP, Flash appeals, Cluster/sector strategies)	Country team	Reference_log	*[List here relevant HPC-documents to be monitored:* *E.g. Iraq HNO 2018, Iraq Flash Appeal Mosul, Shelter Cluster strategy]* *[List here relevant agency-documents to be monitored:* *E.g. UNHCR Country Strategy, UNICEF WASH Response Strategy]*
		# references in single agency documents			
Humanitarian stakeholders are using IMPACT products	Humanitarian actors use IMPACT evidence/products as a basis for decision making, aid planning and delivery Number of humanitarian documents	Perceived relevance of IMPACT country-programs	Country team	Usage_Feedback *and* Usage_Survey template	*[Outline here the usage survey to be implemented for this research cycle* *E.g. Usage survey to be conducted in November 2017, following the release of x outputs, targeting at least 10 partners*
		Perceived usefulness and influence of IMPACT outputs			
		Recommendations to strengthen IMPACT programs			

	(HNO, HRP, cluster/agency strategic plans, etc.) directly informed by IMPACT products	Perceived capacity of IMPACT staff			*E.g. Usage survey to be conducted at the end of the research cycle related to all outputs, targeting at least 20 partners]*
		Perceived quality of outputs/programs			
		Recommendations to strengthen IMPACT programs			
Humanitarian stakeholders are engaged in IMPACT programs throughout the research cycle	Number and/or percentage of humanitarian organizations directly contributing to IMPACT programs *(providing resources, participating to presentations, etc.)*	# of organisations providing resources (i.e.staff, vehicles, meeting space, budget, etc.) for activity implementation	Country team	Engagement_log	□ Yes
		# of organisations/clusters inputting in research design and joint analysis			□ Yes
		# of organisations/clusters attending briefings on findings;			□ Yes