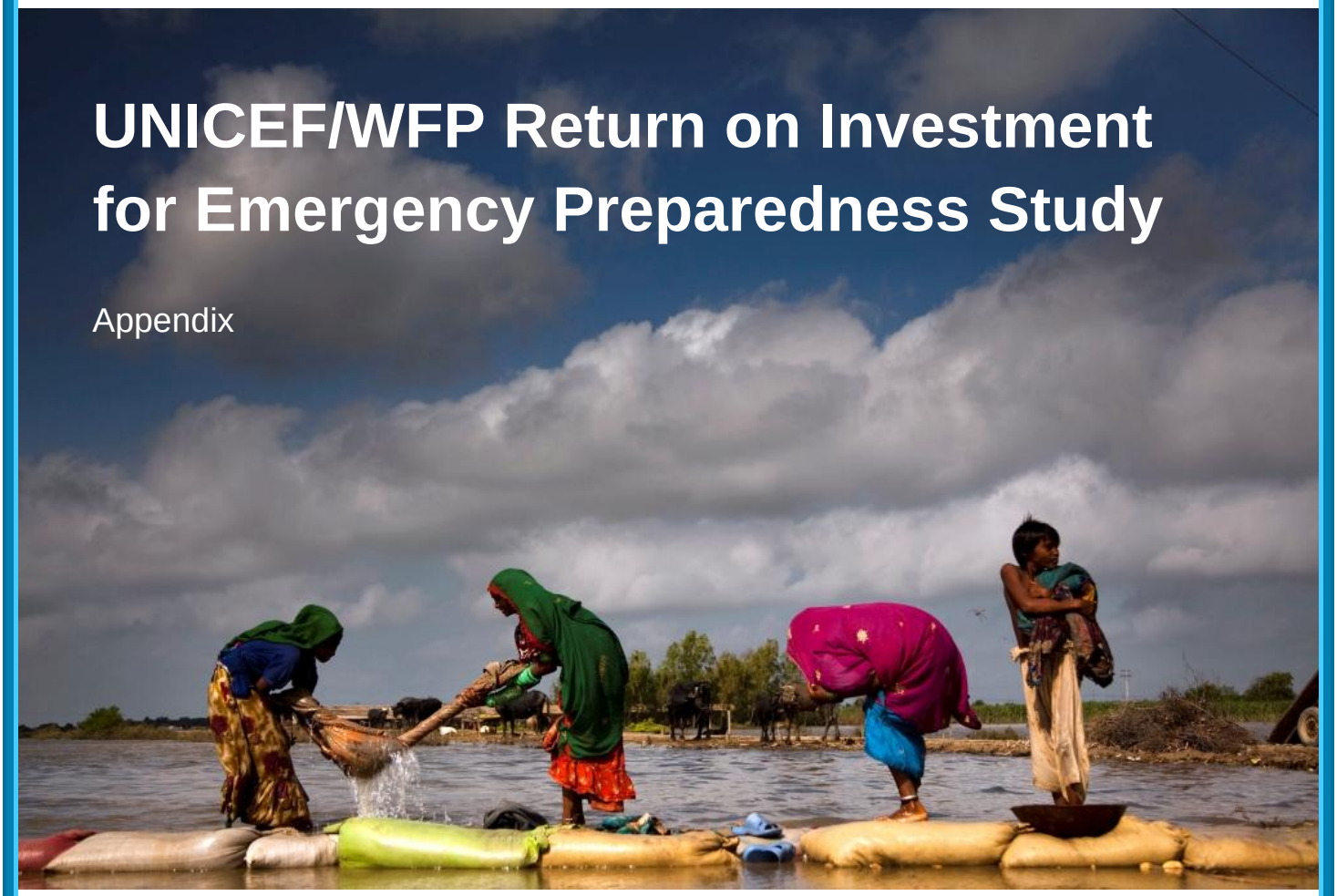
UNICEF/WFP Return on Investment for Emergency Preparedness Study

Appendix



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8. ROI ASSESSMENT FOR THE THREE PILOT COUNTRIES

8.1. Chad

Chad is one of the poorest countries in the world, ranking 184th out of 187 in the 2014 UNDP Human Development Index. Climate hazards and violent conflicts have plagued the country and aggravated poverty since its independence in 1960, resulting in high levels of food insecurity and malnutrition[1], and poor access to water and health services. The Sahelian belt is the most food-insecure part of the country, as it is a particularly fragile environment with a degraded agro-ecological landscape exposed to recurrent shocks such as droughts, floods and crop failures, resulting in food price spikes. Located in a restive geopolitical region, Chad's porous borders areas are also vulnerable to spillover from crises in neighbouring countries, most notably the Central African Republic, Sudan, Libya and Nigeria.

The national level of preparedness is generally weak. According to InfoRM, Chad has the third-highest vulnerability index rating out of 191 countries (at 7.8) and the second-highest lack of coping capacity globally (at 9.0). The lack of national contingency planning, scarcity of human capital and weak institutional coordination of disaster management often hamper timely and cost-effective emergency responses. Additionally, as a landlocked country with limited local transport and supply infrastructure and unreliable operational supply corridors from other neighbouring countries, it faces significant logistical constraints in rapid movement of emergency commodities and services.

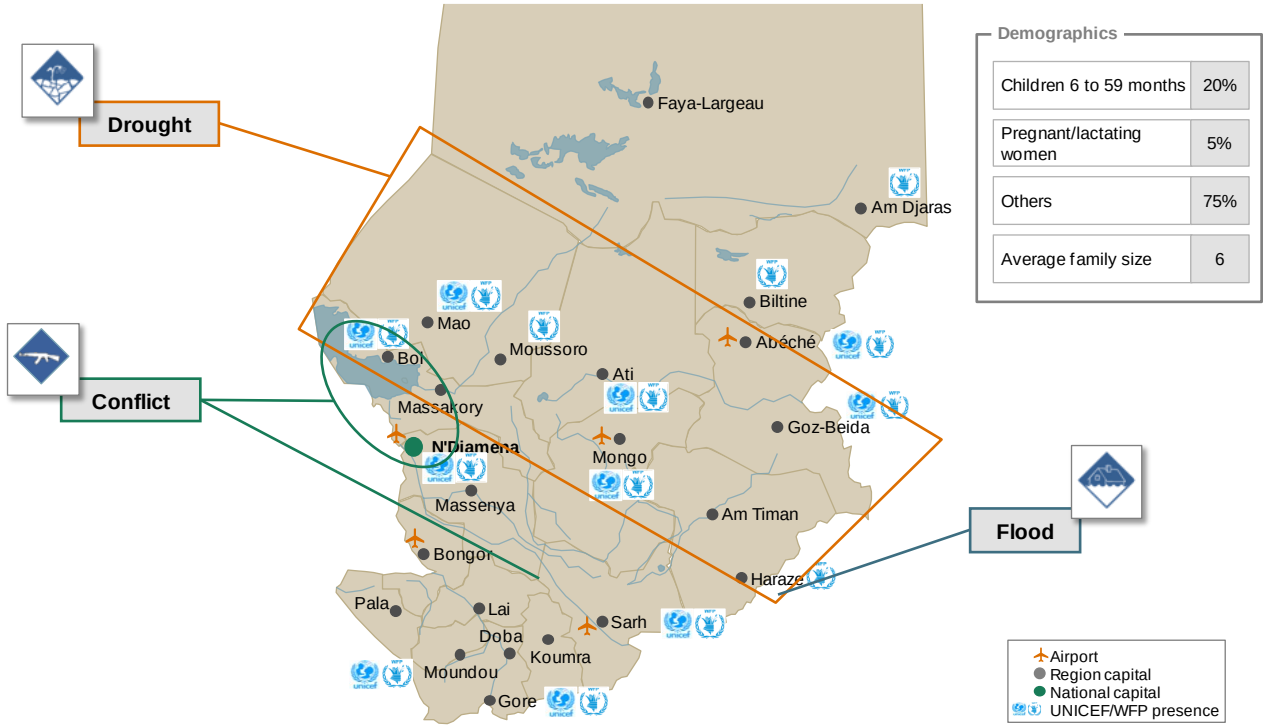
8.1.1. Country risk profile

Three main risk scenarios were defined for Chad together with UNICEF and WFP COs: drought, flood and conflict-related population displacement (internally displaced persons, refugees and returnees).

Figure shows the geographical prevalence of each of these risks and the main demographic assumptions entered in the model.

[1] 30.3% of children are severely or moderately underweight (UNICEF Statistics, 2008–2012).

Figure 13 – Risk scenarios defined for Chad



For each risk, the probability of hazard occurrence, new population in need of assistance[2], related global acute malnutrition rates and duration of assistance were defined. Since a consistent level of drought and conflict-related population displacement materialize every year in Chad, these recurrent yearly risks were not treated as distinct 'emergencies' in the ROI model because UNICEF and WFP respond to them as part of their regular programmes. Similarly, the current, pre-existing caseload of IDPs, refugees and returnees already present in the country were excluded from the study. The risk scenarios therefore include only the occurrence of new crises or significant escalations of existing crises.

Figure 14 shows the details of each scenario. For each type of risk, a smaller and a larger impact scenario were hypothesized based on a historical analysis of context risks and in consultation with UNICEF and WFP emergency experts in each pilot country. Historical data was used for backward-looking projections for drought and flood[3] and for conflict-related displacement[4], but the final figures were adapted based on any available forward-looking projections for each risk.[5] For drought and flood, for instance, the estimates on the probability of hazard occurrence and new population in need were slightly inflated compared to historical data to account for the

[2] Excluding pre-existing caseloads

[3] EM-DAT: The International Disaster Database, 2014. *Country Profiles*. Centre for Research on the Epidemiology of Disasters – CRED. http://www.emdat.be/country-profile

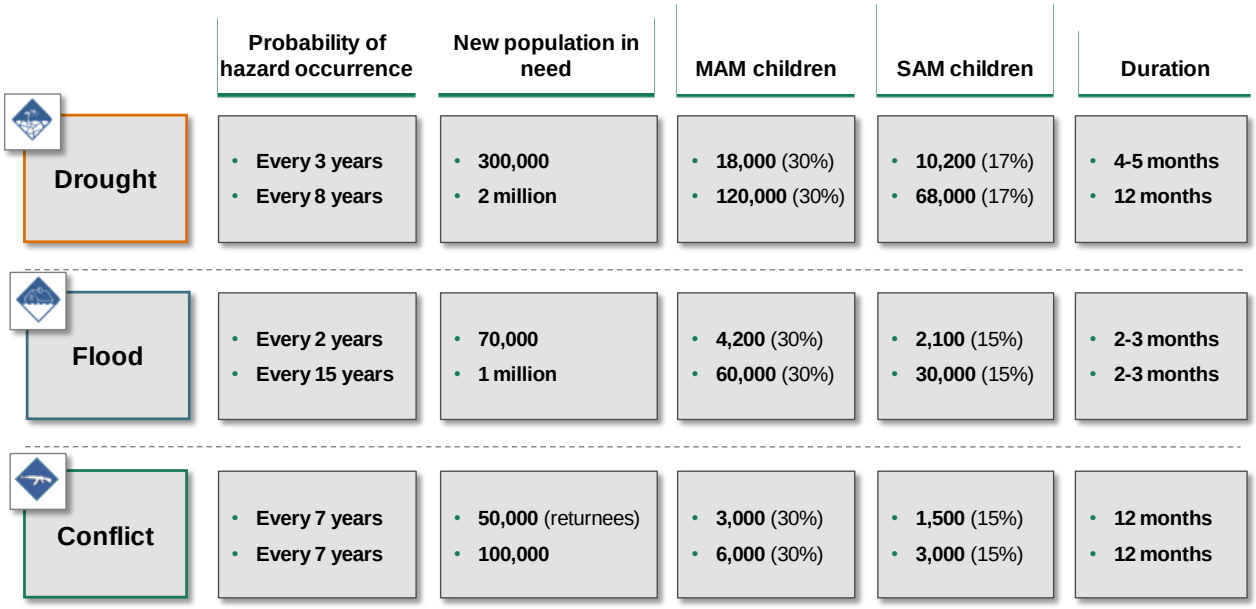
[4] United Nations High Commissioner for Refugees (UNHCR), 2014. *UNHCR Statistical Online Population Database*.

[5] See Appendix 8.1.1. for detailed historical figures.

impacts of climate change[6] as well as estimates provided in the respective national contingency plans. For conflict-related displacement, future projections on the situation in Chad's neighbouring countries (mainly Nigeria) were taken into account.

The estimates on the probability of hazard occurrence defined in *Figure 12* are a critical input to the ROI model.

Figure 14 – Detailed future scenarios assumed for all major risks (Chad)

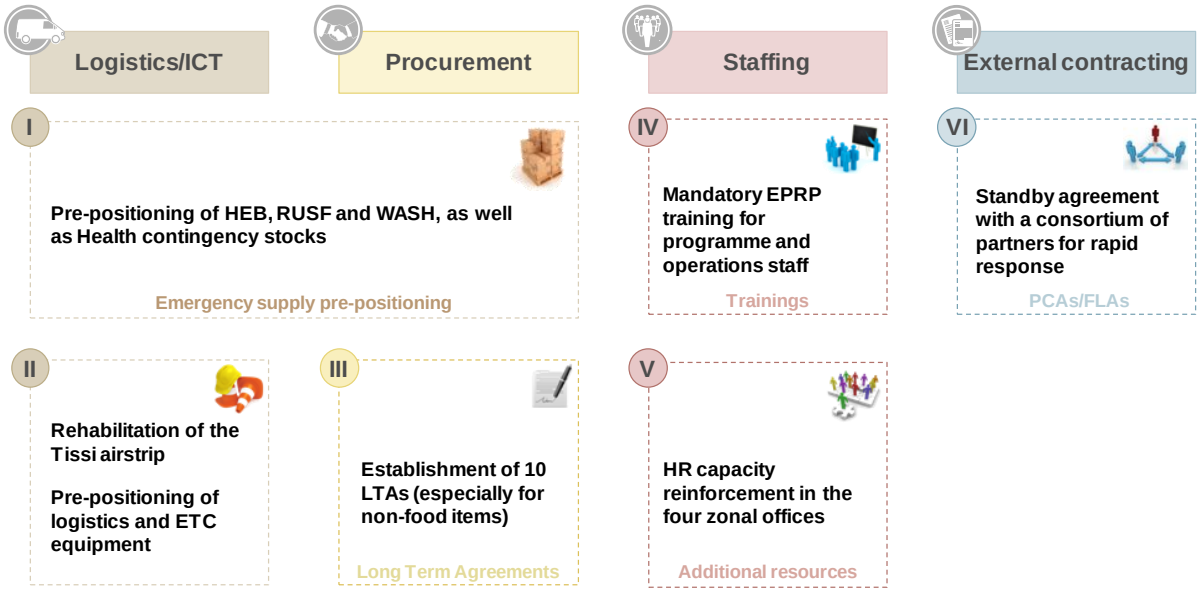


8.1.2. Investments in scope

As illustrated in *Figure* , seven emergency preparedness investments were analysed for Chad, covering the six different types defined in the methodology. These investments were all either fully or partly funded under the DFID Humanitarian Programme.

[6] As pointed out by Kandji et al. (2006, p. 10), *"this is all the more necessary that climate change is likely to increase the frequency of extremes such as droughts and flood in the region."*

Figure 15 – Emergency preparedness investments for Chad[7]



Emergency supply pre-positioning: 25.0 Mt of HEB was pre-positioned to respond to two risk scenarios (conflict-related displacements and floods), while 25.0 Mt of RUSF was pre-positioned to respond to the three risk scenarios (conflict-related displacements, floods and drought), respectively. 15 Mt of both HEB and RUSF will be pre-positioned in Bol, while the rest will be sent to Goz-Beida. RUTF was also pre-positioned in Tissi, but for existing programmes rather than emergency response purposes and was thus excluded from the ROI analysis.

For the WASH and Health sectors, four specific commodities were analysed: bleach, soap, Aquatabs and LLIN. 48.1 kl of bleach, 77.4 Mt of soap, 1.1M Aquatabs and 6,605 LLIN were pre-positioned in 2014, partly under the DFID Humanitarian Programme, with the rest of the costs covered by other donors. The bleach, soap and Aquatabs were relevant for the three risk scenarios and were distributed across the country to various UN and government warehouses and to three displacement centres (Danamadja, Maro and Tissi). The LLINs, however, were only stocked in the three displacement centres to respond to a conflict emergency.

Infrastructure projects: Two different infrastructure initiatives were funded under the DFID Humanitarian Programme: the rehabilitation of the Tissi airstrip and the pre-fabricated offices and ICT equipment in Bol.

[7] UNICEF Chad Work Plan for DFID II; WFP Chad Concept of Operations

Illustration 1 – Tissi airstrip rehabilitation

Due to its strategic location close to the borders with the Central African Republic and Sudan, the Tissi area experiences periodic influxes of refugees/returnees from across the border and already hosts pre-existing caseloads within camps that are spread out across the greater Tissi region. In order to provide assistance to these camps, the airstrip is in constant use throughout the entire year. During the rainy season, the area of Tissi becomes totally inaccessible by road and is cut off for approximately five months, with air transport being the sole means of access for humanitarian operations within the area. The airstrip was, however, previously rendered unusable for landing fixed-wing aircraft during the rainy season, and a helicopter had to be used instead. Its rehabilitation into an all-weather airstrip has facilitated the use of fixed-wing aircraft throughout the year.

Bol is located in the western part of the country and close to the border with Nigeria. This area is often inaccessible by road during the rainy season due to flooding but is also exposed to the additional risk of spillover conflict and refugee influxes due to the continued escalation of the Boko Haram crisis in Northern Nigeria. The CO therefore pre-positioned pre-fabricated offices and ICT equipment required to set up an operational hub to facilitate rapid response by humanitarian partners in the event of an emergency while mitigating safety and security risks for humanitarian personnel and assets in a highly volatile security environment.

Long Term Agreements: Within the timeline of the DFID grant, four new LTAs for emergency procurement of commodities and four new LTAs for transport of supplies were signed. These agreements aimed to increase operational speed and reduce costs while ensuring the reliability of humanitarian response by reserving suppliers' production capacity in advance.

Trainings: Intensive workshops on emergency preparedness and response were held for 60 staff members (all programme staff at central level plus all zonal office chiefs) so as to train staff on planning and implementing key preparedness and response activities in accordance with humanitarian standards and as appropriate to the specific context. The workshops taught participants how to quickly assess the needs and coordinate the response to escalating humanitarian situations relevant to Chad.

Additional resources: One additional supply and logistics staff member was deployed in each of the four zonal offices to provide operational support for emergency response. This preparedness investment is relevant for all risk scenarios, as the additional logistics staff can respond to and are located in the zonal offices close the potential emergency locations for all three humanitarian risks assessed for Chad.

PCAs/FLAs: Nine emergency contingency addendums to existing PCAs were developed for activation in the event of an emergency within the timeline of the DFID grant. These included one PCA for WASH interventions in the event of floods, while the other eight PCAs were relevant to conflict-related displacement within the different sectors of WASH, health, nutrition, education and child protection.[8].

8.1.3. ROI and time savings

Table 1 – Summary of time and cost savings for emergency preparedness investments in Chad

	Total investment (000$)	Total gross savings (000$)	Total net savings (000$)	ROI	Time savings (days)
Pre-positioning					
HEB	86.9	136.2	49.3	1.6	28–29
RUSF	118.0	198.2	80.2	1.7	28–29
Bleach	113.9	109.2	-4.8	1.0	12
Soap	147.0	141.1	-5.9	1.0	12
Aquatabs	36.2	90.1	53.9	2.5	14
LLIN	32.7	52.8	20.2	1.6	14
Infrastructure projects					
Tissi airstrip	680.0	5,220.4	4,540.4	7.7	-
Bol	358.9	-	-	-	26
LTAs					
Commodities	-	-	-	-	30
Transport	-	-	-	-	21
Training					
EPRP workshop	6.5	121.6	115.1	18.7	4
Additional resources					
Four new logistics staff	84.7	85.5	0.8	1.0	4
PCAs/FLAs					
Nine PCAs	23.2	383.5	355.4	16.3	10.5

Table 1 summarizes the time and cost savings from each preparedness investment in Chad. All investments examined in the Chad case study demonstrate strong 'returns' on either cost or time

[8] Cooperating partners under this PCAs included SID, AFDI, Terre verte/CELIAF, CARE, IRC, CSSI, OPAD and ADES.

savings or both, suggesting that all preparedness interventions taken were beneficial in purely financial and/or response speed terms, even when additional qualitative spillover benefits were excluded. None of the preparedness investments undertaken were shown to slow emergency response.

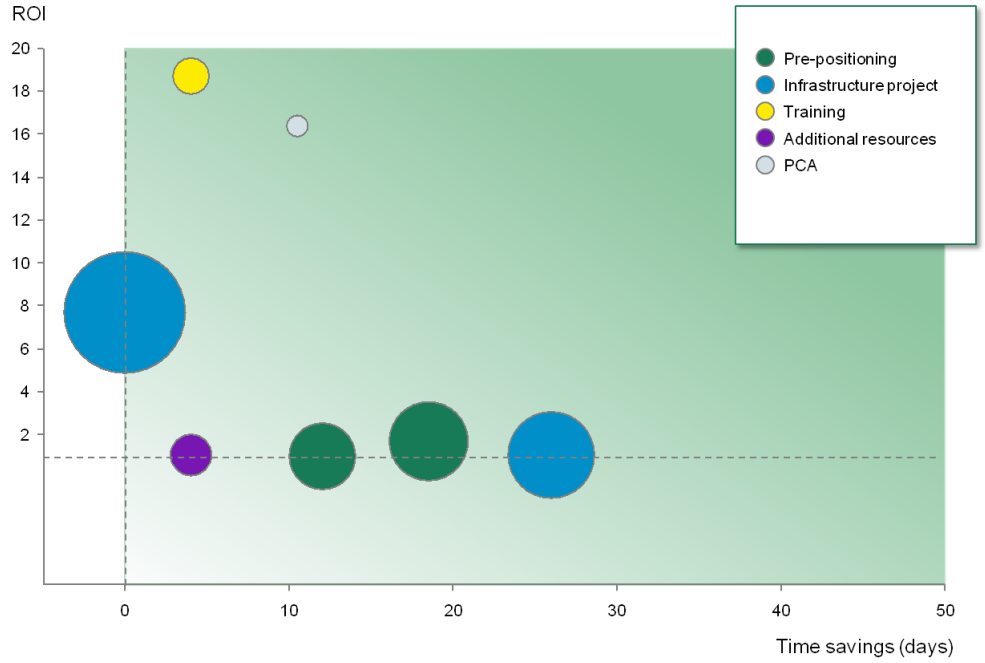
Comparatively, the highest ROIs came from the emergency preparedness and response staff training workshops (18.9), the PCAs (16.6) and the rehabilitation of Tissi airstrip (7.7). These high ROI figures for the training workshops and the PCAs can be explained by the fact that the initial upfront investments were limited and yielded relatively high cash flows. The Tissi airstrip in contrast represents the largest upfront investment analysed in Chad ($680,000), but the large annual savings generated allow for a very fast payback. As the Tissi rehabilitation will last for a much longer period of time[9], the total discounted cash flow generated leads to a high ROI. Even without taking into account any additional qualitative benefits, these investments make a lot of sense from a purely financial perspective.

On the other hand, LTAs for commodities and transport (21 to 30 days), BoI pre-fabricated offices and ICT equipment (26 days) and pre-positioning investments (12 to 29 days) showed the largest time savings. Such large gains in speed of operations are often critical during emergencies. Cost savings for both the BoI pre-positioning investment and LTAs were excluded due to the lack of sufficient reliable historical data to support the analysis. Both investments, however, contribute to increased reliability of UNICEF/WFP responses.

The only investment with an ROI slightly below 1 was the pre-positioning of locally procured soap and bleach (0.96), while additional resources investment was cost neutral, with an ROI of 1. The relatively low ROI of soap and bleach is explained by the balance between the additional storage costs to pre-position the commodities and the higher emergency transport costs to deliver the same supplies to an emergency had no pre-positioning been done. However, the transport cost differential for locally procured goods is minimal compared to that of internationally sourced goods, explaining the latter's high ROI values compared to those for soap and bleach. If this balance is a zero-sum game for Chad from a financial perspective, pre-positioning still affords significant time savings during an emergency and ensures the availability of key humanitarian resources. Increasing staff capacity in the zonal offices does not significantly save costs compared to only reacting periodically to emergencies. But additional resources have other qualitative benefits, as the additional staff members are present locally, performing other functions throughout the entire year.

[9] A 10-year period has been accounted for in the model, as opposed to other investments such as pre-positioning that are 'consumed' after their first use.

Figure 16 – Visual representation of time and cost savings in Chad[10]



All investments made in Chad have either a significant financial ROI or time savings – some had both dimensions. However, if choices are to be made, the investments in trainings showed higher ROIs than those in additional resources but had a relatively similar effect on the time dimension. While pre-positioned goods procured internationally had higher financial ROI than those locally procured, both showed large gains in rapidity during emergency situations. Finally, both infrastructure investments show positive impacts on both cost and time savings.

8.2. Pakistan

Sharing a long and porous 1,640-mile border with Afghanistan, Pakistan is located in a politically unstable and strategically sensitive region. Since 2008, security operations in the country's northwest have led to major population displacements with serious social, security and humanitarian access implications. Response and recovery have been hampered by security restrictions in the volatile Federally Administered Tribal Areas (FATA), and 1.65 million IDPs[11] are living in camps (3%) or host communities (97%) that are often restricted from access. Limited humanitarian access is a persistent and critical risk factor for UNICEF, WFP and other humanitarian organizations across all operational platforms. Looking forward, the difficult political,

[10] LTAs and other investments for which cost savings not calculated were excluded from the analysis

[11] According to the International Displacement Monitoring Center, 1.15 million IDPs were in camp as of June 2014. However, another 500,000 people became IDPs as they fled from North Waziristan between the end of June and July, as indicated in the Preliminary Response Plan (OCHA, 2014).

security and economic situation in Afghanistan poses the risk of additional waves of refugees seeking assistance in Khyber Pakhtunkhwa (KP), FATA and Balochistan.

Increasingly intense and recurrent natural disasters in recent years have also exacerbated disparities and contributed to a sharp decline in food and nutrition security. The country is subject to frequent flooding from monsoon rains, and its location at the centre of tectonic plates makes it vulnerable to earthquakes. The 2010 floods affected 20 million people and left 10 million in need of humanitarian assistance. Moreover, the Sindh and Balochistan provinces chronically experience severe drought-like conditions.

This combination of high human and natural hazards, together with the large national population (over 180 million inhabitants), explains the very large-scale operations for UNICEF and WFP. Both country offices are the largest amongst the three pilot countries of this study: The 2014 UNICEF Pakistan budget amounted to ~$154M, while WFP planned for ~$200M. However, Pakistan has a strong national transport and supply infrastructure with strong local market capacities.[12] The government of Pakistan's capacity in leading national responses to emergencies has also significantly increased over the last decades, as illustrated by a relatively low rating of 5.9 on the index for lack of coping capacity on InfoRM (ranked 61st out of 191 countries).

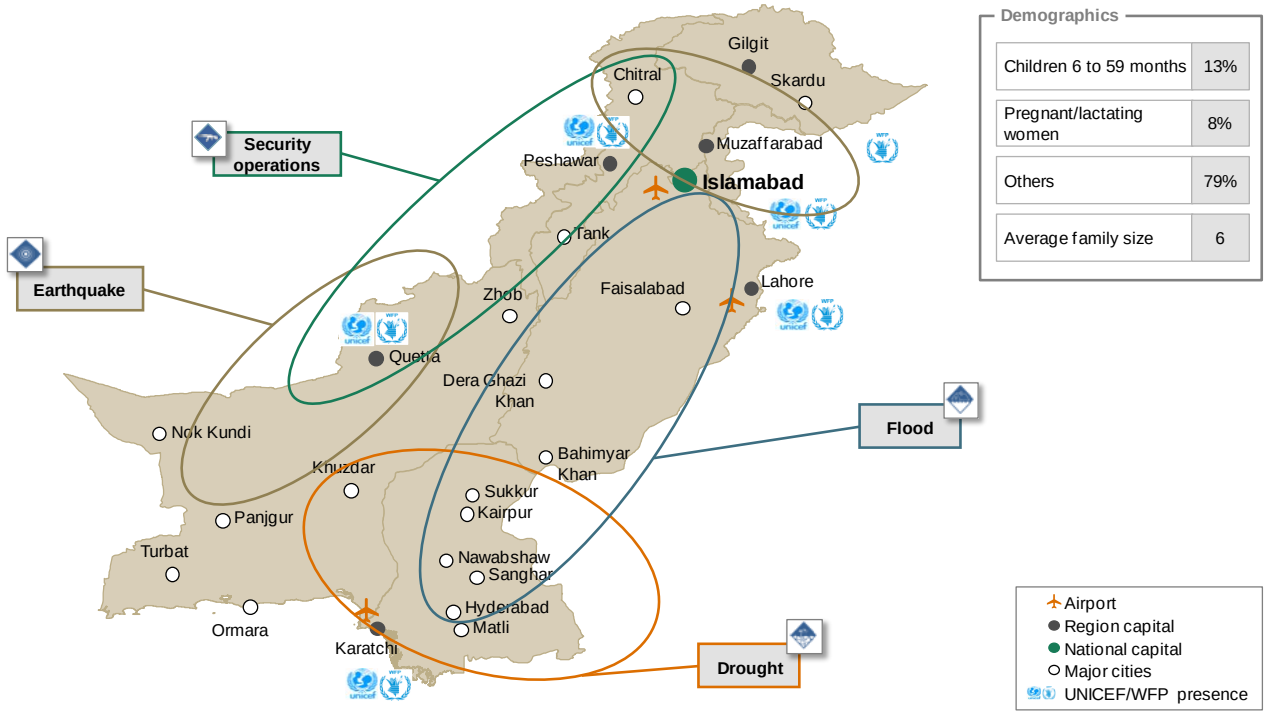
8.2.1. Country risk profile

Four risk scenarios were included in the study: security operations, floods, earthquake and drought-like conditions.

Figure shows where each of these risks is mainly prevalent throughout the country.

[12] Pakistan is the eighth-largest producer of wheat worldwide (FAOSTAT, 2012).

Figure 17 – Risk scenarios defined for Pakistan



The probability of hazard occurrence, new populations in need of humanitarian assistance, global acute malnutrition rates and duration of assistance have been summarized in *Figure* . For security operations in the country's northwest (KP and FATA regions), the projected population estimates for the smaller risk scenario (every two years) were derived from the country's interagency strategic response plan.[13, 14]

[13] Humanitarian Country Team (HCT), Strategic Plan Pakistan 2014

[14] For earthquake, although additional forward-looking analysis would ideally have been included to strengthen the probability of hazard occurrence figures, no reliable source could be found

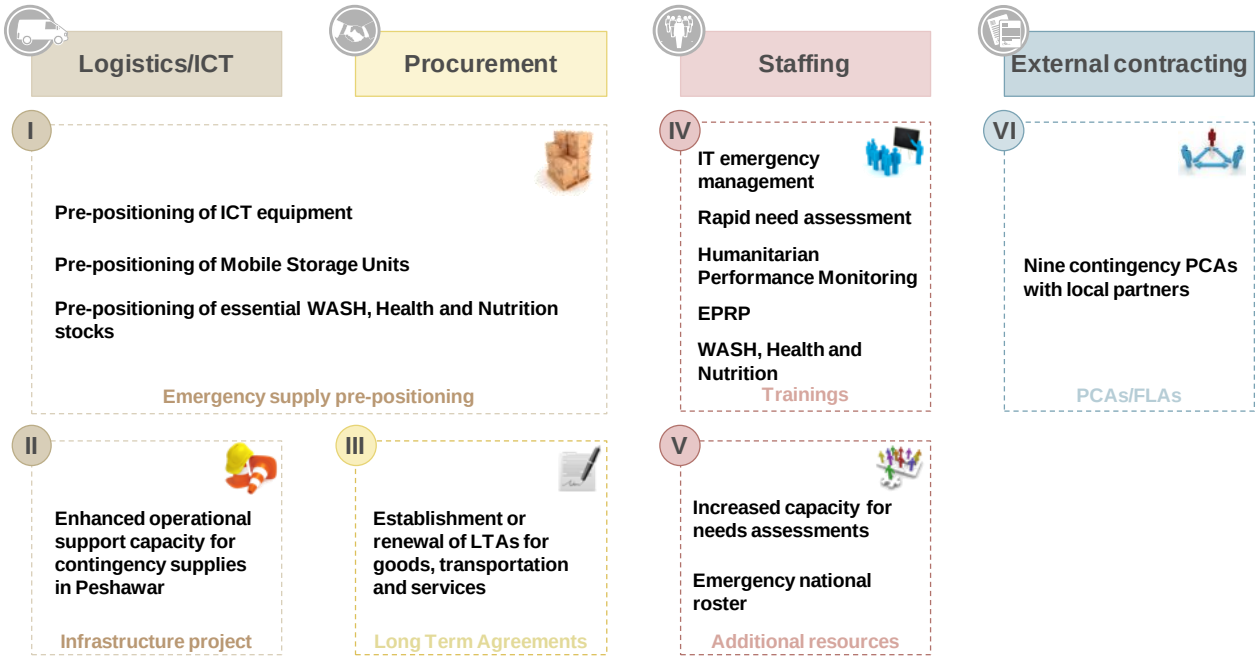
Figure 18 – Detailed future scenarios assumed for all major risks (Pakistan)

	Probability of hazard occurrence	New population in need	MAM children	SAM children	Duration
Flood	• Every 2.5 years • Every 6 years	• 2 million • 10 million	• 22,400 (9%) • 112,100 (9%)	• 12,100 (5%) • 60,500 (5%)	• 6 months • 9 months
Security operations	• Within 2 years • Within 2 years • Within 7 years	• 330,000 (IDPs) • 270,000 (returnees) • 2 million	• 8,800 (21%) • 7,200 (21%) • 53,600 (21%)	• 3,500 (8%) • 2,900 (8%) • 21,400 (8%)	• 12 months • 12 months • 12 months
Earthquake	• Every 2 years • Every 30 years	• 100,000 • 5 million	• 1,300 (10%) • 64,300 (10%)	• 500 (4%) • 25,700 (4%)	• 3 months • 6 months
Drought-like conditions	• Every 2-3 years • Every 15 years	• 1 million • 3 million	• 12,600 (10%) • 60,500 (16%)	• 8,800 (7%) • 41,600 (11%)	• 6 months • 12 months

8.2.2. Investments in scope

Thirteen different emergency preparedness investments were analysed in Pakistan. As illustrated in *Figure 19*, quite a few concerned HR-related activities. All analysed investments were either fully or partly funded under the DFID Humanitarian Programme.

Figure 19 – Emergency preparedness investments for Pakistan[15]



Emergency supply pre-positioning: Different types of commodities were pre-positioned throughout the country:

- Key commodities from the WASH, Health and Nutrition sectors (namely RUTF, micronutrient powder, ORS, zinc, (family) hygiene kits and LLINs) were pre-positioned in warehouses located in both Islamabad and Karachi for rapid distribution in case of an emergency.
- Spare parts/accessories to re-kit 17 Mobile Storage Units were also purchased under the DFID grant. This facilitated the pre-positioning of the previously unusable MSU units in Nasir Bagh (Peshawar) for further deployment to emergency locations in the region in the event of either floods or population displacements due to security operations.
- The minimum sets of ICT equipment (including radios, generators, cables, etc.) required to respond to two emergencies of any type are being stocked in Islamabad and Karachi.

[15] UNICEF Pakistan Work Plan for DFID II; WFP Pakistan Concept of Operations

Illustration 2 – Nasir Bagh platform work

Infrastructure project: The warehouse of Nasir Bagh (Peshawar) not only serves as the main logistical hub for operations in the KP and FATA regions, but also supports operations in neighbouring Afghanistan. The warehouse has a storage capacity in excess of 35,000 Mt for commodities, but only 10,000 Mt of this is covered storage capacity, while the remaining 25,000 Mt is open storage space. While the open storage is used for brief periods, commodities can be exposed to adverse weather conditions. The commodities must therefore be protected using plastic sheeting and tarpaulin coverings. Moreover, this poses a huge reputational risk in the event of floods due to the increased risk of commodity losses for other humanitarian partners who also use the facility during emergencies. The 2010 floods, for instance, had a devastating impact resulting in dramatic losses of critical commodities in two other warehouses within the region.[16] To mitigate such losses in the future, one-metre-high concrete platforms were constructed to install 45 MSUs to improve warehousing efficiency and expand covered storage capacity by an additional 10,000–15,000 Mt tonnes, thus boosting the capacity of the Logistics Cluster to provide logistical support during emergencies.

Long Term Agreements: In 2014, 23 new local LTAs for goods and services were established, while more than 50 existing LTAs were updated with local suppliers and transport companies. Additionally, four LTAs (one in each province) were signed with an expert consulting firm in field monitoring for both development and humanitarian activities. These LTAs allow the CO to delegate the monitoring of its programme activities to a specialized company in times of emergency. This in turn allows for the higher-frequency, result-based monitoring and reporting that better informs responses, as well as an expanded geographical reach since monitors located in sensitive or insecure areas are often able to access areas inaccessible to UN staff members due to security restrictions.

Trainings: Five different trainings were supported by the DFID Humanitarian Programme:

- A three-day training on ICT emergency management was provided to mid-level managers from UNICEF, WFP and other UN agencies. The objective of this intensive course was to ensure timely, predictable and effective information management from the onset of an emergency and better coordination between relevant humanitarian stakeholders.
- A three- to four-day training on rapid need assessment was planned for 10–12 technical staff members from WFP (VAM team), UNICEF, OCHA, FAO, UNHCR and the national government. The focus of the training was on quantitative and analytical skills to improve the quality and efficiency of joint inter-agency needs assessments and the use of

[16] Aza Khel and Peer Payaee warehouses in Peshawar

personal digital assistant devices (PDAs) for real-time data collection and analysis and for quality control purposes.

- In order to build a result-based monitoring framework on monitoring coordination (including in times of emergency) and to enhance knowledge transfer, a two-day Humanitarian Performance Monitoring (HPM) training was organized for both CO staff and local partners and governmental bodies.
- Emergency staff members in the provinces of KP/FATA and Balochistan received a two-day training on Emergency Preparedness and Response Planning (EPRP). Similar to the one organized in Chad, this training allows for better planning of all aspects of emergency preparedness and response. Participants were coached on the use of specialized humanitarian tools (e.g., Excel-automated models to estimate CCC-based supply requirements following preliminary need assessments) and briefed on the key actions to perform.
- Specific sectoral trainings (for Health, WASH and Nutrition) were held in two provinces (KP/FATA and Balochistan) on Community-Based Disaster Risk Management (CBDRM), which includes a large emergency preparedness training section. In total, 136 people including cluster and government staff were trained through these two workshops.

Additional resources: Three additional people were integrated into the VAM team. Of these, two were deployed to the provincial offices in Peshawar and Karachi to boost field-level analytical capacities and lead the emergency rapid need assessments, while the third is based in Islamabad and is dedicated to statistical design and analysis and to conducting in-house trainings for other staff members.

Another preparedness activity performed by both UNICEF and WFP was the establishment of national emergency rosters with a pool of pre-qualified staff who can be quickly hired and mobilized in the event of a crisis. All roster candidates have already worked with UNICEF and WFP in the past or have been interviewed by UNICEF/WFP for relevant roles. They can therefore be called up and directly assigned to an emergency, which saves critical time and costs in the recruitment of additional staff.

PCAs/FLAs: Nine emergency contingency PCAs were signed to prepare specifically for a potential new influx of Afghan refugees: two for WASH with the Rural Development Initiative and the Water, Environment and Sanitation Society, two for Nutrition with Frontier Primary Health Care and the American Refugee Committee, two for Child Protection with Change Through Empowerment and Basic Education & Employable Skill Training, one for Health with Frontier Primary Health Care and two for Primary Education with BEFARE (Basic Education for Awareness Reforms and Empowerment) and SESPB (Society for Community Strengthening and Promotion of Education, Balochistan). In the event of an emergency, these agreements can be activated immediately to scale up programmatic interventions without delay.

8.2.3. ROI and time savings

Table 2 – Summary of time and cost savings for emergency preparedness investments in Pakistan

	Total investment (000$)	Total gross savings (000$)	Total net savings (000$)	ROI	Time savings (days)
Pre-positioning					
RUTF	64.7	119.3	54.6	1.8	14
Micronutrient powder	13.5	17.8	4.3	1.3	14
ORS	82.0	184.9	102.9	2.3	14
Zinc	8.3	8.6	0.3	1.0	14
Family hygiene kit	400.4	378.5	-21.9	0.9	6
Hygiene kit	453.2	428.4	-24.7	0.9	6
LLIN	27.5	24.5	-3.0	0.9	6
MSU	388.7	717.8	329.1	1.8	4
ICT equipment	137.1	143.6	6.5	1.0	49
Infrastructure project					
Nasir Bagh	1,504.1	2,195.2	691.1	1.5	-
LTAs					
Goods and services	2.1	-	-	-	10–38
Commodities and transport	2.1	-	-	-	7
Monitoring	10.1	67.1	56.9	6.6	15–16
Training					
ICT emergency mgmt.	15.6	165.5	149.9	10.6	8–9
Rapid need assessment	20.0	-	-	-	7
HPM	20.0	156.5	136.5	7.8	15–16
EPRP	15.0	24.2	9.2	1.6	30–31
Sectoral trainings	66.0	-	-	-	8
Additional resources					
VAM team	61.4	13.5	-47.9	0.2	23
National rosters	3.5	43.8	40.3	12.4	8–9
PCAs/FLAs					
Nine PCAs	2.8	-	-	-	14

Table 2 summarizes the time and cost savings from each preparedness investment in Pakistan. All investments saved either time or costs or both, and there was no investment that slowed down emergency response times.

The highest ROIs were related to trainings, which focused on enhancing local capabilities to prepare and respond to emergency situations, thus minimizing costly international deployments. The ICT emergency management training had the highest ROI, while the Humanitarian Performance Monitoring (HPM) and the EPRP trainings also provided significant returns by avoiding additional local staff reassignment during emergencies. The rapid need assessment training and the sectoral trainings do not include a dollar savings dimension because the additional costs needed to reach the same level of service without the trainings were not quantifiable due to a lack of sufficient reliable data to support this analysis. The main benefits of these interventions were primarily the quality and timeliness of UNICEF/WFP emergency responses.

A high ROI was also observed from the establishment of national rosters for emergency response. This is a 'must do' investment. Keeping a roster up-to-date requires limited staff capacity but can save precious time and resources during an emergency. On the other hand, the VAM additional resources investment had a negative ROI because boosting full-time staff capacity costs more than periodically increasing staff capacity during emergencies but has enormous time savings and qualitative benefits to overall service provision.

Field monitoring LTAs also generated strong cost and time savings. While the initial investment of signing these agreements is rather limited (only staff time), they can save costs on staff reassignments to perform the third-party monitoring in the field during emergencies.

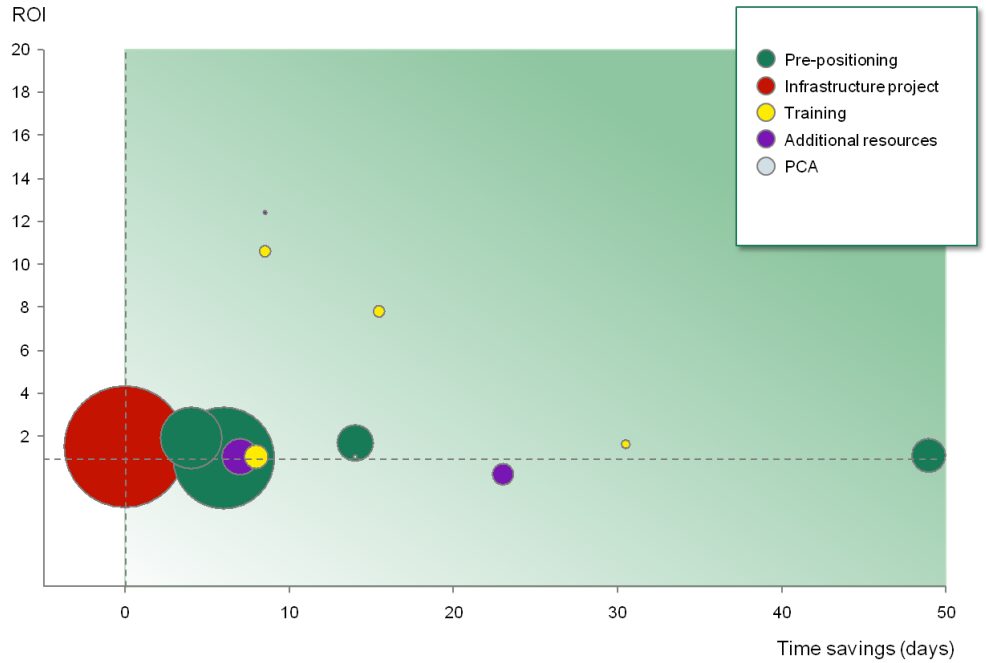
The pre-positioning activities showed different patterns for locally and internationally sourced commodities. Hygiene kits (composed of locally sourced products) and LLINs had ROIs slightly below 1. Due to a strong local supply infrastructure, the prices of these commodities do not experience significant peaks during emergencies. Pre-positioning therefore does not lead to large cost savings, but allows a faster response from UNICEF/WFP since six days of delivery time are saved. Only the ICT equipment had an ROI just above 1, as local suppliers would generally ask for a price premium during an emergency. Since local suppliers would still have to import most of the ICT equipment[17], the lead time saved due to the pre-positioning investment is significant (up to 49 days). Internationally sourced commodities, on the other hand, all had strong positive ROIs. This was because the required air transport costs in case of emergency for RUTF, micronutrient powders, ORS, zinc and MSUs was significantly more expensive than the sea transport costs incurred during the pre-positioning activity.

Also remarkable were the large cash flows generated by Nasir Bagh investment. This infrastructure work required the largest upfront investment ($1.5M), but saves significant costs in potential food losses and temporary storage costs (tarpaulins and plastic sheeting) to recoup the investment ($100,000 will be saved every year, on top of more than $2.0M in food losses in the event of a major flood).

[17] Direct international sourcing by UNICEF/WFP would not be possible for most of the ICT equipment due to government restrictions.

Finally, LTAs and PCAs represent very small investments (only the staff capacity required to process the agreements) but enable UNICEF/WFP to get additional suppliers or partners on board much faster during emergencies. Unlike in Chad, it was not feasible to quantify exact cost savings from PCAs due to insufficient reliable historical data.

Figure 20 – Visual representation of time and cost savings in Pakistan[18]



As a country with better coping capacity and well-established transport and supply infrastructure, it has moved away from pre-positioning of basic food commodities to investing more in higher-yielding human capital initiatives. The general pattern regarding the different returns from training and additional resources is also observed. However, given the complexity of the security situation and the bureaucratic travel authorization procedures in politically sensitive and insecure regions, time savings from having well-trained people at the right place are inflated.

8.3. Madagascar

Madagascar is among the poorest countries in the world. In 2010, 87.7% of the population lived on less than $1.25 a day, and 95.1% on less than $2.00 a day.[19] The country has not yet recovered from the political crisis that followed the coup d'état of 2009 and that led to the suspension of the majority of international aid. Although development partners have progressively recommitted themselves since 2012, the volume of aid remains at half of its pre-

[18] LTAs and other investments for which cost savings not calculated were excluded from the analysis
[19] World Bank, 2014. *Poverty headcount ratio at 1.25$ a day (PPP)*. http://data.worldbank.org/indicator/SI.POV.DDAY

crisis levels. [20] As a consequence, the government lacks significant resources to invest in basic social services and to assist the population in case of emergencies. This is illustrated by a high rating of 7.7 on the lack of coping capacity index on InfoRM (ranked 17th out of 191 countries). UN agencies like UNICEF and WFP therefore play an important role in supporting the government in reinforcing its capacity and ability to respond to emergencies. The main government counterparts for all emergency preparedness activities are the Bureau National de Gestion des Risques et des Catastrophes (BNGRC) and its operational arm, the Corps de Protection Civile (CPC).

Madagascar is highly prone to natural disasters, and climate change now threatens to exacerbate these risks. In the last four decades, over 50 natural disasters have recurrently caused destruction on the island.[21] While the south suffers from recurrent droughts, cyclones, often accompanied by floods, can strike several parts of the country. The eastern coastline was historically the main gateway for cyclones. However, in the past two decades, cyclones have also started to hit the western coast with a marked increase in frequency and intensity also noted during this period. The increasing fragility of the ecosystem, caused by inadequate education, insufficient productive infrastructure (including agricultural infrastructure) and poverty is a major cause of the increased vulnerability to shocks and related food insecurity.

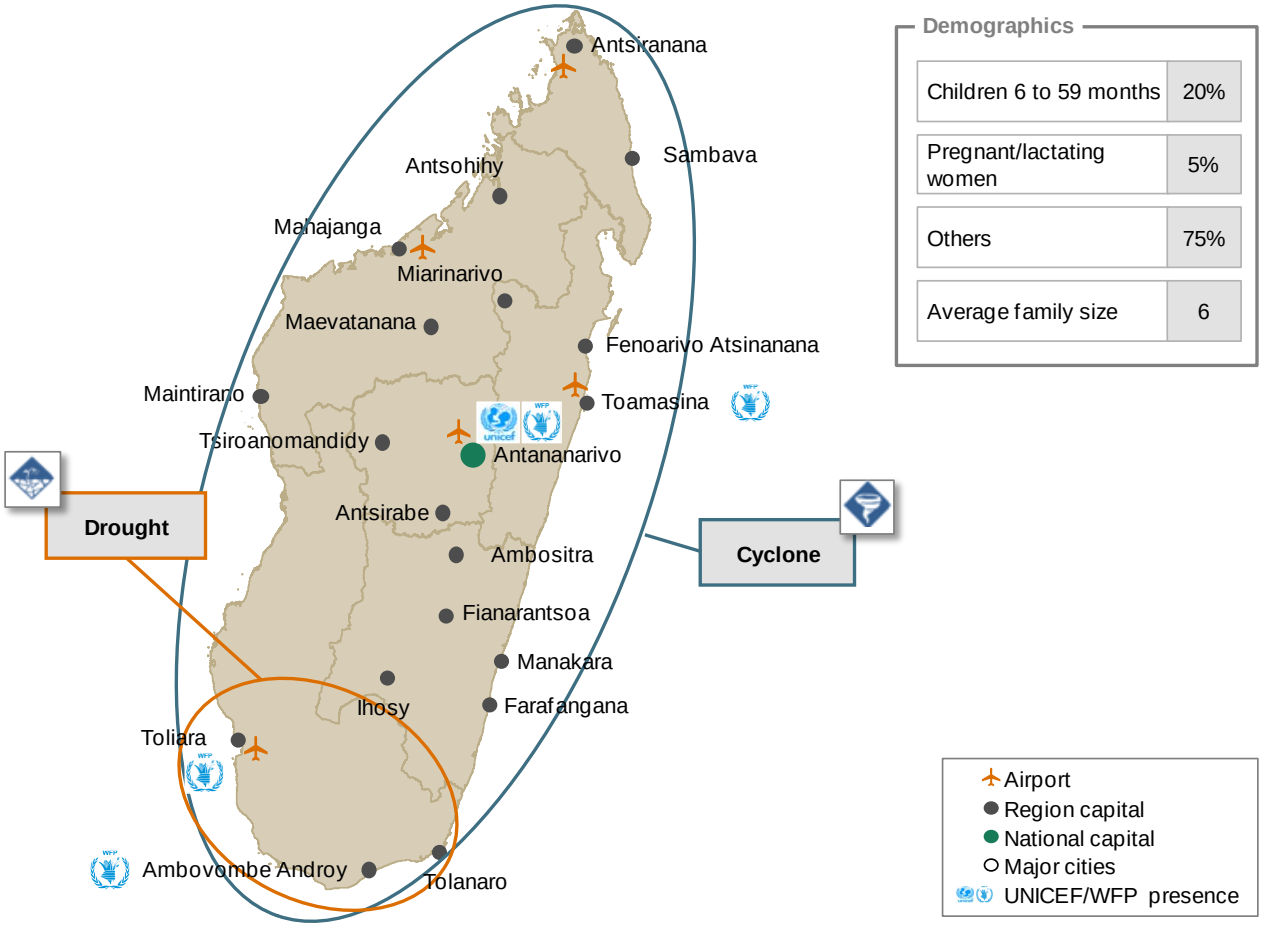
8.3.1. Country risk profile

Both drought and cyclone (including the associated floods) scenarios were analysed in the study. *Figure* illustrates this new trend that, while droughts are largely confined to the south, cyclones now hit the entire perimeter coast of the country.

[20] UNICEF Madagasar, 2012. *Kit d'information*.

[21] EM-DAT: The International Disaster Database, 2014. *Country Profiles*. Centre for Research on the Epidemiology of Disasters – CRED. http://www.emdat.be/country-profile

Figure 21 – Risk scenarios defined for Madagascar



Different thresholds for the risk scenarios included in the model are summarized in Figure . Again, recurrent 'smaller–scale' emergencies materializing every year were excluded from the model. Over the last 10 years, Madagascar has been hit every year by at least one cyclone affecting up to 100,000 people.[22] While acknowledging this annual risk, the model excluded it from the ROI analysis due to its high predictability. On top of historical figures and COs' experience, the new figures for population in need were derived from the 2013–14 *Outil de Synthèse: Plan de Contingence National et du Comité Permanent Inter-Agence – Cyclone et inondation*.[23]

[22] OCHA Madagascar, 2014. *Tableau & graphique dégât cyclonique 2001 à 2012*; EM-DAT: The International Disaster Database, 2014. *Country Profiles*. Centre for Research on the Epidemiology of Disasters – CRED. http://www.emdat.be/country-profile

[23] Bureau National de Gestion des Risques et des Catastrophes (BNGRC) and the Inter-Agency Standing Committee (IASC), 2013–2014. *Outil de Synthèse: Plan de Contingence National et du Comité Permanent Inter-Agence – Cyclone et inondation.*

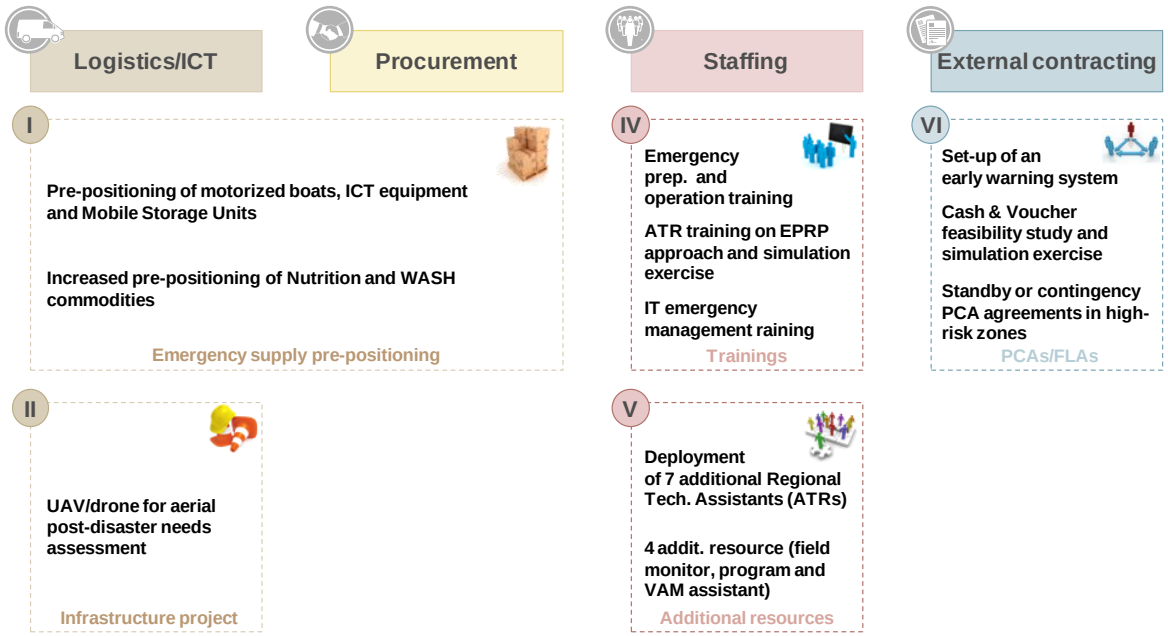
Figure 22 – Detailed future scenarios assumed for all major risks (Madagascar)

	Probability of hazard occurrence	New population in need	MAM children	SAM children	Duration
Cyclone	• Every 2 years • Every 5 years	• 270,000 • 720,000	• 4,400 (8%) • 11,800 (8%)	• 540 (1%) • 1,400 (1%)	• 1 month • 6 months
Drought	• Every 7-8 years	• 600,000	• 9,300 (8%)	• 1,200 (1%)	• 6 months

8.3.2. Investments in scope

Eleven different emergency preparedness investments were analysed in Madagascar and consisted of investments either fully or partly funded under the DFID Humanitarian Programme.

Figure 23 – Emergency preparedness investments for Madagascar[24]



[24] UNICEF Pakistan Work Plan for DFID II; WFP Pakistan Concept of Operations

Emergency supply pre-positioning: Different types of commodities were pre-positioned, mainly in the capital. Given the unpredictability of the location of the next cyclone, the centralized location of Antananarivo on the island makes it a strategic hub for pre-positioning emergency supplies.

- $64,935 (including transport and storage cost) of various ICT equipment were pre-positioned in the capital. These included; radios, computers, generators, BGAN terminals, scanners, printers and repeaters that are crucial for better coordination and information management during emergencies.
- 14 Mt of RUTF, 34 Mt of soap and more than 100,000 sachets of water flocculant/disinfectant powder were also pre-positioned in Antananarivo in case of cyclone or drought.
- Two Mobile Storage Units valued at $13,123 each were also procured. One was donated to the CPC to be pre-positioned in the southeast, while the second was pre-positioned in the east in Tamatave for the event of a cyclone.
- Two motorized boats were procured and pre-positioned in Antananarivo. They were also donated to the CPC, but will be available to the UN community in the event of a cyclone for emergency assessments and search and rescue operations in isolated locations. One of the main advantages of these boats is that – unlike most of the boats available on the Malagasy market – they are compliant with UN security norms, allowing UN staff to be transported on them.

Infrastructure project: The team also analysed the purchase of two UAVs for post-disaster aerial needs assessment. In the immediate aftermath of a cyclone, UAVs can complement the role of helicopters in the assessment of the damages and in determining the needs of the population. Due to their limited flight radius, UAVs cannot fully replace the need for helicopters, since large-scale cyclones often affect large geographical areas. However, once the most critically affected zones have been identified by helicopter, UAVs can take over aerial assessment work and provide much more precise information and imagery of the situation. This saves cost and time from reduced helicopter usage and also provides higher-quality post-disaster needs assessments with greater specificity in terms of the magnitude of the damages, people affected and required interventions.

Trainings: Three different trainings were conducted with support from the DFID Humanitarian Programme:

- Three workshops (in Antananarivo, Ambovombe and Toliara) were held on emergency preparedness and operation. These 2.5-day trainings were given in total to 20 CO staff and 50 partners. Participants were briefed on the EPRP package and MIRA assessment. The objective of the training was to speed up responses at the onset of an emergency due to increased knowledge of the protocols, improved coordination and higher-quality assessment of the strategic humanitarian priorities.
- 48 regional technical assistants (ATRs) were trained in rapid assessments and response methodology to improve reporting on emergency needs and impact (using SMS surveys) and to assist authorities within their regions in properly following preparedness and

response protocols. In addition to policy and planning-related training on humanitarian needs assessment, emergency response and use of early warning SMS systems, participants also operationalized their new knowledge with a simulation exercise to test emergency response in real time.

- A three-day training on ICT emergency management was provided to 21 ICT personnel drawn from various stakeholders (government, UN, NGOs and the private sector). This intensive course covered a wide range of topics such as ICT capacity gap analysis, operations management, business continuity plans and coordination frameworks to ensure timely, predictable and effective information management from the onset of an emergency and better coordination between relevant humanitarian stakeholders. The training also raised the participants' awareness of the international laws covering emergency response.

Additional resources: Staff capacity was also reinforced in two different areas:

- To ensure that the CO has ongoing field presence for emergency preparedness and response, seven Regional Technical Assistants embedded within four government ministries (Water, Social Protection, Education and Health) were funded.
- Two field aid monitors for emergency preparedness and operations in the east and the southeast, one programme assistant and one VAM assistant based in Antananarivo were also recruited.

In both cases, the additional staff capacity allow for faster mobilization of resources and partners on the ground during an emergency and more accurate monitoring of the risks and evaluation of humanitarian needs.

Partnerships/external contracting: Three different types of partnership activities were conducted by UNICEF/WFP COs for emergency preparedness purposes:

- In collaboration with the BNGRC, a Community Preparedness Early Warning system was put in place in cyclone-prone coastal areas. 1,500 Fokontany[25] were equipped with Early Warning kits (including mobile phone devices with SIM cards for disaster information transfer by SMS, solar, and/or crank radios and weather warning flags). The local committees for risk and disaster management in 200 Fokontany were also trained by the BNGRC on the use of the equipment, emergency colour codes and the fast reaction matrix so as to make rapid informed decisions at the onset of a cyclone.

Illustration 3 – Community training session on the Early Warning system

- The CO conducted a feasibility assessment of cash- and/or voucher-based interventions. This included an assessment of 16 local markets and local retail supply chains to determine price fluctuation, seasonality and reactivity of supply and demand and capacity of financial service providers (banks, mobile phone companies and micro-finance institutions) and to identify operational partners with knowledge and skills in cash transfers and mitigation measures needed to minimize misuse and fraud in cash modalities. In addition to this, a Cash & Voucher simulation exercise was conducted with a cooperating partner that has adequate field experience to evaluate the relevance and feasibility of the approach.
- 15 to 20 new standby agreements with cooperating partners were signed for the distribution of food in high risk areas

[25] Subdivisions of the communes headed by a chief

8.3.3. ROI and time savings

Table 3 – Summary of time and cost savings for emergency preparedness investments in Madagascar

	Total investment (000$)	Total gross savings (000$)	Total net savings (000$)	ROI	Time savings (days)
Pre-positioning					
ICT equipment	64.9	61.7	-3.2	1.0	35–36
RUTF	57.1	122.7	65.7	2.1	14
MSU	32.9	52.6	19.7	1.6	7
Motorized boats	24.3	49.8	25.5	2.1	5
Water flocculant powder	4.3	7.9	3.6	1.8	3–4
Soap	4.2	3.0	-1.2	0.7	2
Infrastructure project					
Two UAVs	20.0	46.4	26.4	2.3	-
Training					
Emergency preparedness and operations	54.1	72.5	18.3	1.3	4
ATR training	35.8	52.8	17.1	1.5	3
ICT emergency mgmt.	19.7	59.3	39.5	3.0	4
Additional resources					
Seven ATRs	184.1	126.8	-57.3	0.7	3
Field monitors, VAM and programme assistants	104.4	26.0	-78.4	0.3	3
Partnerships/external contracting					
EW system	350.8	-	-	-	-
C&V study and simulation	69.9	-	-	-	-
Standby agreements	3.5	5.1	1.6	1.5	2–3

Table 3 summarizes the time and cost savings from each preparedness investment in Madagascar. The highest ROIs observed were from the trainings and the UAVs. The three types of trainings enhanced national staff capacity, reducing reliance on more costly international staff support. The UAVs represent a relatively small initial investment ($20,000)[26] and, although they do not fully replace the need for helicopters during an emergency, the part of the helicopter work they can take over is already sufficient to generate large savings.

[26] Including training costs for the UAV operators

Internationally sourced commodities (RUTF, MSU, motorized boats and water flocculant powder) also had very strong financial ROIs and time savings. Given that Madagascar is a remote island, the cost-efficiency of sea transport compared to airlifting is multiplied. On the other hand, the ROIs of ICT equipment (a mix of locally and internationally purchased products) and locally procured soap are slightly below 1. Although in-country transport costs for the ICT equipment are higher in case of emergency (due to the use of planes), the cost savings are negligible. However, both investments allow crucial time savings at the onset of an emergency. Additional resources also yield an ROI below 1 (for the extra ATRs and the field monitors, VAM and Programme assistants).

In the external contracting and partnerships focus area, no financial ROIs were calculated for the early warning system or the cash and voucher study and simulations. For the early warning system, the project was still at an early stage of implementation at the time of this study. Since the investment in community-level early warning systems in Madagascar remains quite low and is still in its formative stages, there was limited historical evidence or reliable community-level data to support a rigorous quantitative analysis of the expected benefits of such early warning systems in saving lives and mitigating economic losses among affected communities. Due to time constraints placed on the study, it was also not possible or within the scope of this study to collect and collate the extensive household-level data required to meet the data quality thresholds to measure the impact of early warning systems at mitigating losses at a household level.[27] Such detailed household-level data would have been critical to capture the full cost savings realized during a cyclone and thus to calculate an accurate financial ROI. However, other research suggests strong positive returns from Community-Level Early Warning systems.[28] Discussions held with community leaders during EWS trainings in Tamatave indicated that they felt increasingly empowered and engaged in supporting their respective Fokotany (villages) to self-organize and prepare for cyclones without fully relying on external assistance. The early warning equipment will also facilitate faster top-down and bottom-up communication and coordination between the affected villages and the national authorities during cyclones. There is also the added benefit of simultaneously disseminating real-time data to humanitarian partners to facilitate faster emergency assessments, and targeted, rapid responses with reduced time and resources (staff, vehicles, supplies) expended on conducting emergency assessments independently.

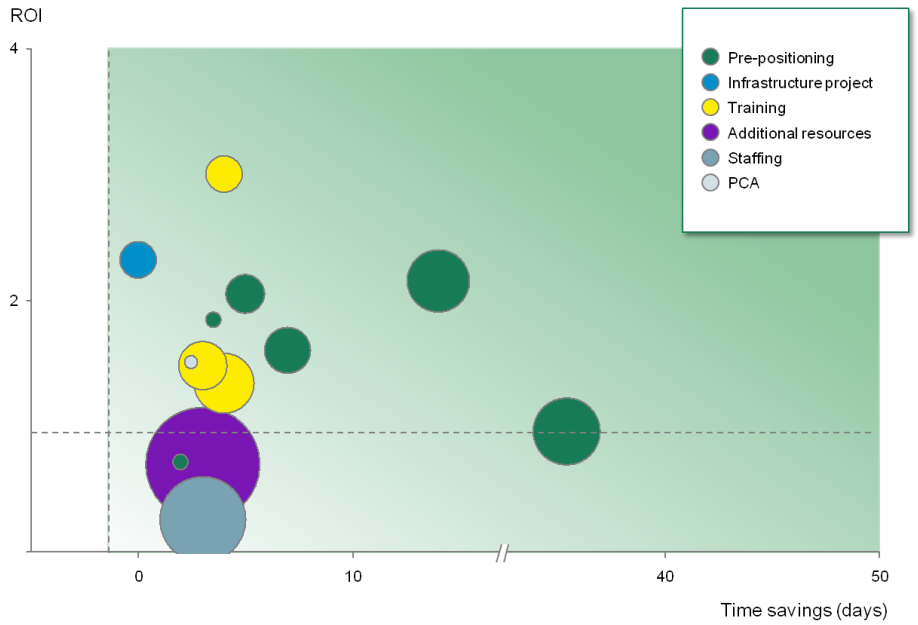
A comparable reasoning holds for the cash and voucher investments. The cash and voucher project is also in its early stages of implementation. The feasibility study and the simulation exercise were first necessary steps and allowed a better understanding of the market structure and dynamics. The results were used to further develop a methodology on rapid assessments of post-crisis markets and the resulting impact on C&V modalities. Further preparedness

[27] Blown-off roofs, rotten wood inhabitations, cut-off roads, flooded crop lands, uprooted lychee trees, etc.

[28] Subbiah et al. (2008) conducted five case studies of Early Warning systems in Asian countries for flood and cyclones scenarios and proved cost-benefit ratios between 0.93 and 558.9 over a ten-year period. Similarly, Woodruff (2008) found that an improved flood forecasting system in Samoa would yield a cost-benefit ratio between 1.72 and 1.92 depending on the discount rate. Additionally, Kull et al. (2003) estimated the cost-benefit ratio of an Early Warning system in the Lai River Basin in Pakistan at 1.6.

investments are required in biometric identification and registration systems to minimize misuse and fraud and enable price collection and monitoring systems, standardized beneficiary cards, signing of financial arrangements with banks and mobile phone companies and training of operational partners (mainly for registration, complaint mechanisms and community sensitization) in order to roll out C&V modalities for the 2015–2016 cyclone season. Once these systems are in place, strong evidence from other countries suggests that a future cash and voucher programme would not only improve the CO's cost-efficiency but would also have strong positive impact on the beneficiaries.[29]

Figure 24 – Visual representation of time and cost savings in Madagascar[30]



Looking at the mix of emergency preparedness investments analysed for Madagascar, all of them saved either time or costs or both. Trainings, infrastructure work and pre-positioning of international products showed the highest time and cost savings. This general pattern may be further explained by the specificities of Madagascar: a remote location and a relatively low level of coping capacity from the national structure. Further investments in capacity-building for both UNICEF/WFP and governmental agencies as well as in the procurement of commodities and products not produced locally should therefore be encouraged in the future.

[29] When using a randomized evaluation to assess the impacts and cost-effectiveness of cash, food vouchers, and food transfers, Hidrodo et al. (2012) found that vouchers lead to significantly larger increases in dietary diversity and has have a marginal cost of $3.3 compared to $11.5 to provide a food transfer. Although acknowledging that this may not apply to other settings, the authors concluded that food vouchers are the most cost-effective modality across most indicators. Other benefits of C&V pointed out by previous WFP projects include reduced food storage losses of beneficiaries (by allowing people to purchase food when they need it), inclusion of perishable foods such as dairy products in transfers (which would not be possible if direct food transfers were used), stimulation of local markets and better management of operations when using electronic vouchers (WFP, 2011).

[30] LTAs and other investments for which cost savings not calculated were excluded from the analysis

9. DETAILS OF RISK SCENARIO CALCULATIONS

As outlined in sections 6.1.1, 6.2.1 and 6.3.1, the defined risk scenarios were a key input for all calculations. For this, two complementary approaches were followed. The main model calculates the next expected scenario in terms of caseload, duration and time until materialization. The assigned probabilities for each scenario are used as weights.[31] For all further calculations, only the next expected emergency scenario is taken into account.

To test the predictability of the model, additional probabilistic Monte Carlo simulations were performed. This takes probabilities and caseloads of all risks as input and simulates random years, where the outcome ranges between no emergency in a given year to all the risk scenarios materializing within the same year. Thus, the second approach has by trend slightly higher caseloads.[32] As this is an elaborate analytical approach requiring specific software and skills, it is only used for sensitivity analysis but is not part of the final model.

However, for all calculations some general assumptions were made:

- All events (risk types and specific scenarios) are independent of each other – thus, it may be that none of the events take place or that all occur at the same time.
- For the probabilities or recurrence times as well as impact (caseload), historical data was used as a baseline (see the next section).
- Forward-looking projections (where available) were included in the assessment for selected risks (e.g., more recent data on conflict and climate change for flood and drought).
- For all sectors and/or commodities of both organizations, specific operational targets were defined to calculate their effect on the overall needs for the country's emergency scenario.

9.1. Historical data on risk scenarios

Figure , Figure and *Figure* 27 show the historical data on the frequency and impact of relevant risks that was used as a starting point for the risk profile definition of the three pilot countries. EM-DAT was used as the primary data source for affected population estimates for natural hazards (namely drought, flood, earthquake and cyclones). For conflict, the UNHCR database was leveraged. The conflict estimates on the graphs only reflect new influxes of conflict-displaced populations – refugees, returnees (and IDPs for Pakistan); they exclude pre-existing caseloads already present in the country and as such do not correspond to the total population of refugees, returnees and IDPs for the respective years.

[31] The details of the calculation are shown in *Figure 3* in the main part.

[32] What was not taken into account is the increased vulnerability of households due to several shocks striking consecutively. This resilience perspective was not in the scope of this study.

Figure 25 – Historical baseline data on Chad's risk profile

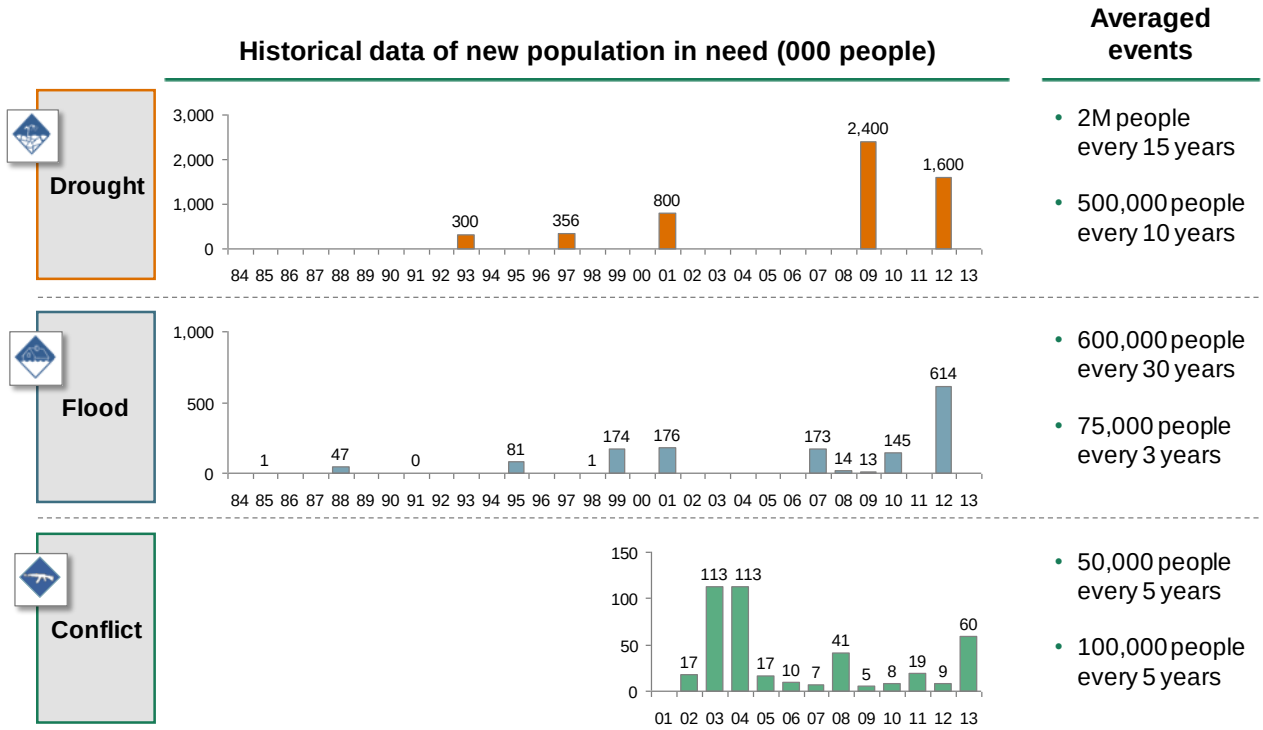


Figure 26 – Historical baseline data on Pakistan's risk profile

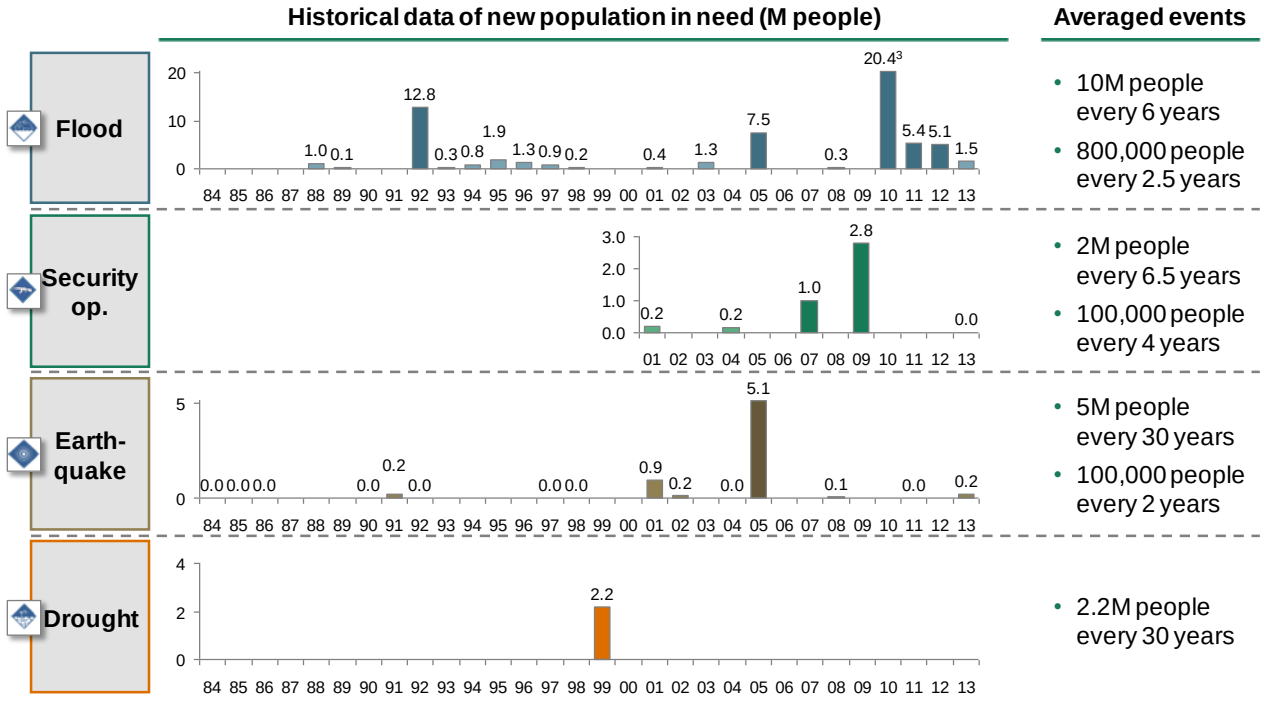
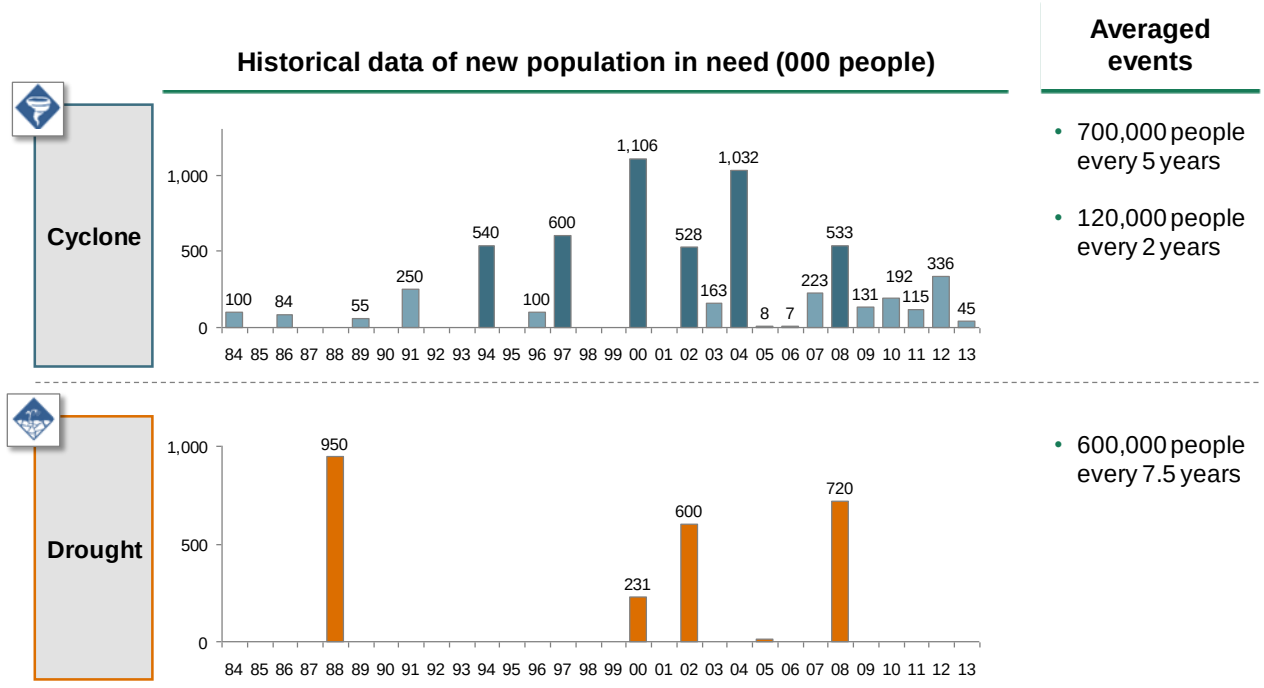


Figure 27 – Historical baseline data on Madagascar's risk profile

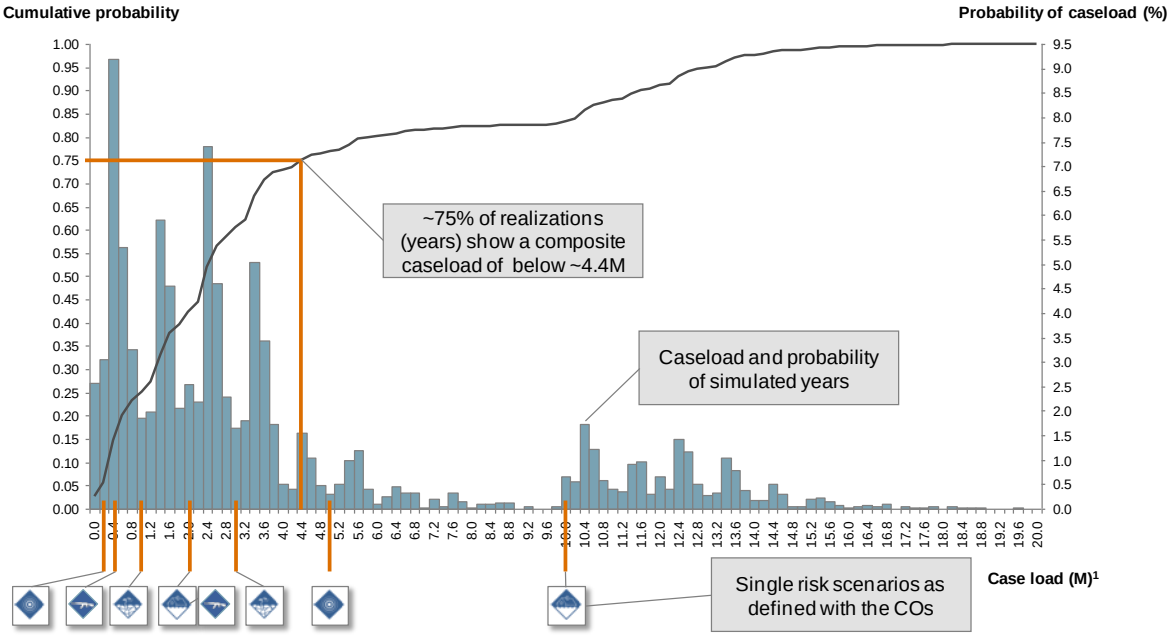


9.2. Monte Carlo analysis

The Monte Carlo analysis was performed in the model for one particular type of preparedness investment: emergency supply pre-positioning. Pre-positioning is indeed the only investment that is fully scalable for the magnitude of the emergencies. While the quantity of a pre-positioned commodity can be freely adjusted to optimize the emergency response, it is difficult to invest in half of an airstrip or to provide the same training four times.

The analysis simulates random years, taking the probabilities of the specified risk assumptions as a starting point. Thus, the simulated year reflects all possible combinations of the single risk. The probabilities are fixed, but the final materialization is left to the probabilistic nature of the simulation. Monte Carlo simulations allow repetitive cycles for a large number of years. For this study, we used 5,000 repetitions or simulated years. *Figure* 28 shows the results of simulation for the case of Pakistan.

Figure 28 – Monte Carlo simulation for Pakistan's risk scenario



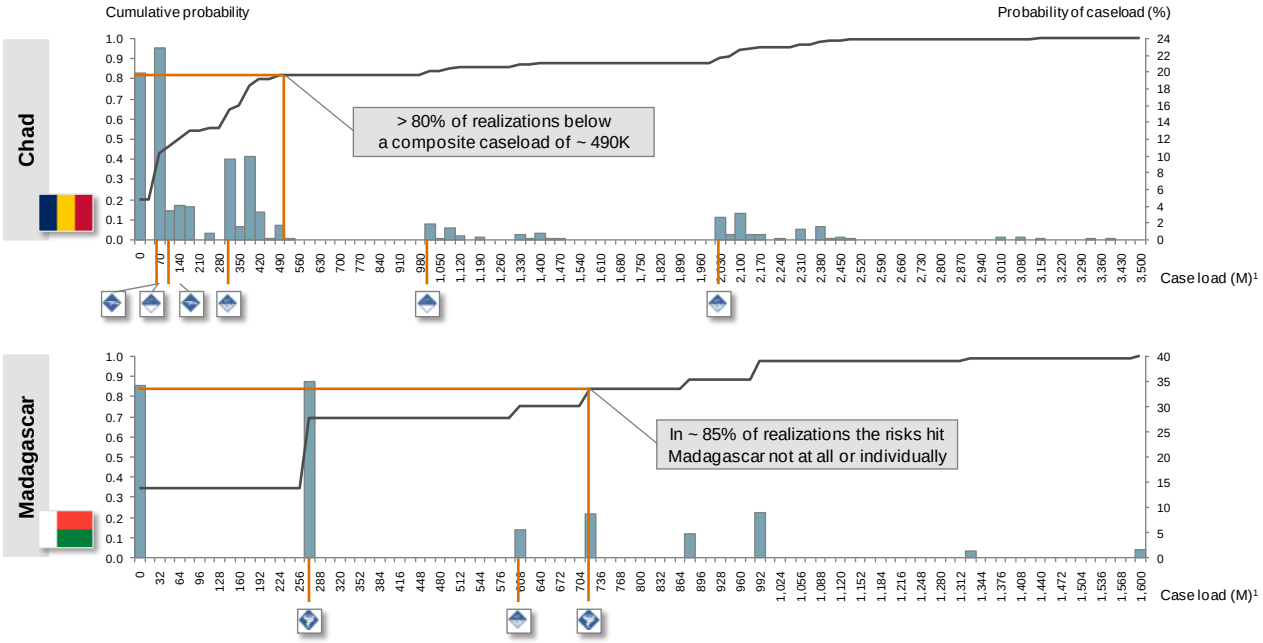
The x-axis depicts the overall caseload of a simulated year, ranging from 0 to more than 20 million.[33] The bars connected with the right axis represent the probability that a specific caseload was simulated (number of outcomes divided by the total number of simulations). The highest single probability is for caseload numbers between 200,000 and 400,000 beneficiaries at over 9%. The cumulative probability depicted by the line sums up all single probabilities. It is steeply

[33] The probability that all risk scenarios happen simultaneously and a caseload of 23.8 million would materialize is very low, at 0.00011%, and did not occur in the 5,000 simulated years above. The probability that none of the risks materialize is 2.9% and is clearly visible in the above graph.

inclined for smaller caseloads and levels out for higher ones. This shows that approximately 75% of realizations (years) have a composite caseload of below 4.3 million. Higher caseloads only materialize when one of the major risks (earthquakes and major floods affecting 5 and 20 million people, respectively) hit the country.

In contrast to the nine risk scenarios for Pakistan, Chad and Madagascar had only six and three less complex scenarios, respectively. This is why their respective simulation results are less smooth. However, the cumulative curve has a similar structure. *Figure* summarizes the results for these two countries.

Figure 29 – Monte Carlo simulation for Chad and Madagascar

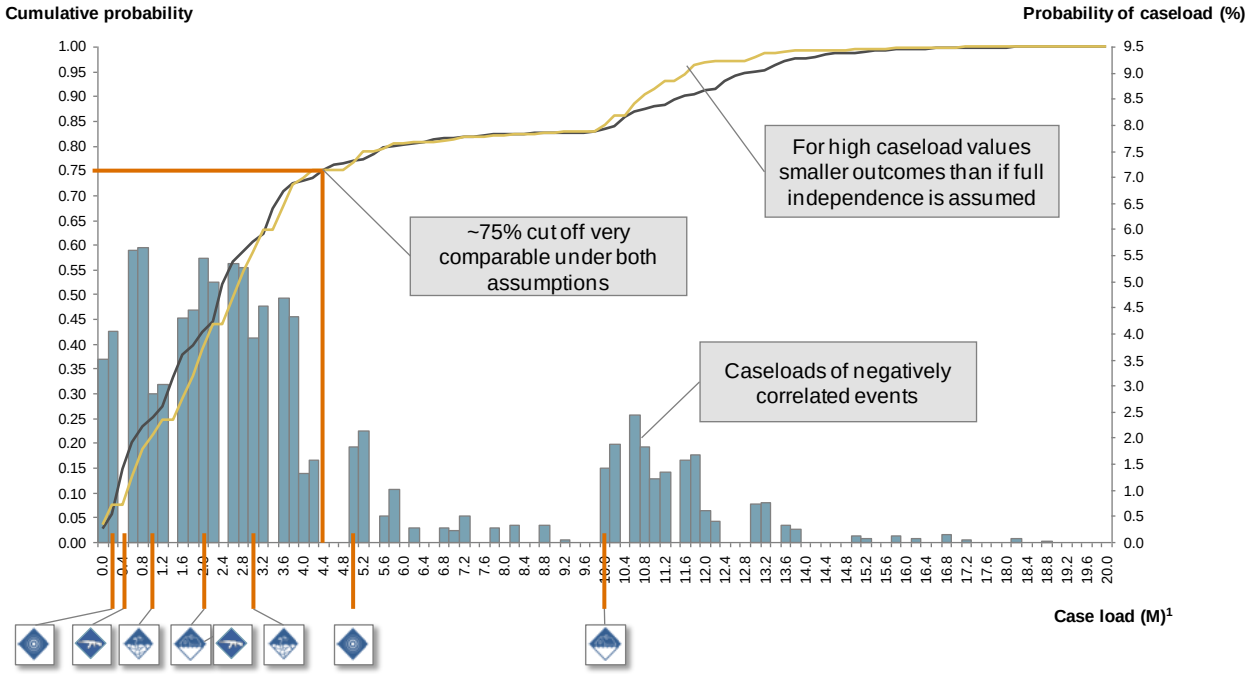


As an additional sensitivity test, a Monte Carlo simulation was run without the strong assumption of the total independence of each individual event. Thus, two similar risk types were not allowed to hit in the same year (e.g., a small and large flood would not hit Pakistan in the same year). The resulting cumulative probability line is covered in

Figure . The comparison shows very small variations. As the interdependency of the individual risk types is very complex with limited added value, all other simulations retained the independence assumption.[34]

[34] The only case where this is not true is when two risks are totally dependent, in which case we treated them as one risk. This is the case in Madagascar, for example, where we only show a cyclone risk that implicitly includes the flood that always hits in the aftermath.

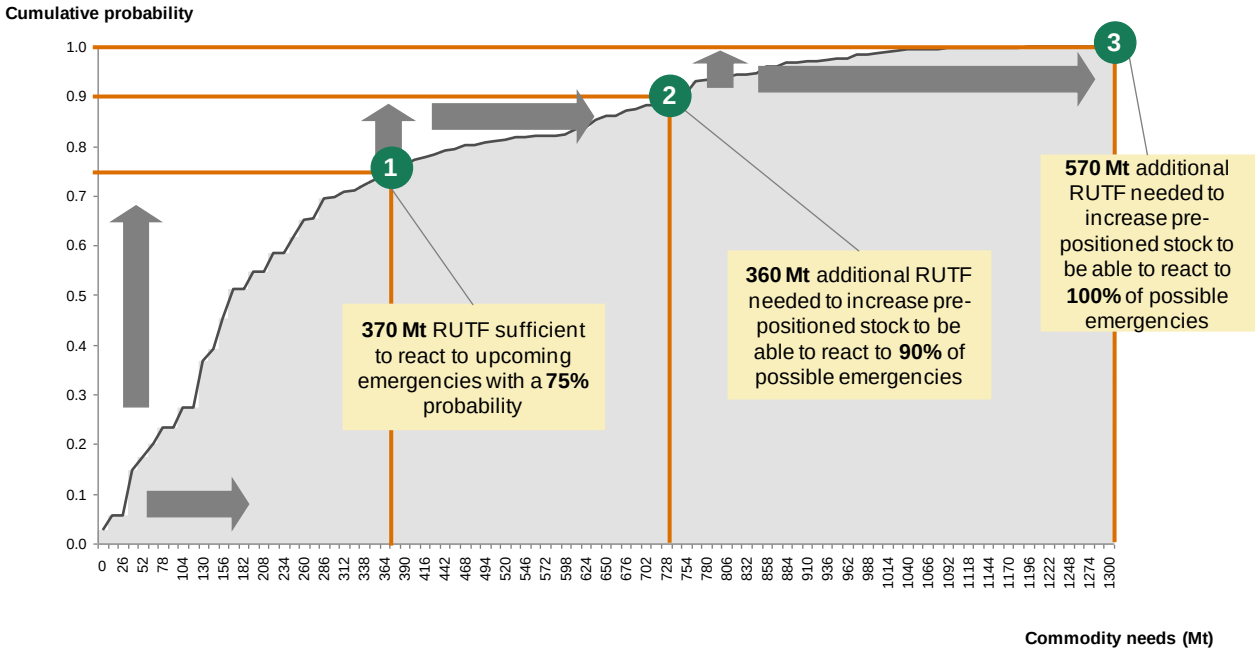
Figure 30 – Monte Carlo results with and without independence



For each risk scenario, UNICEF and WFP had specific operational targets out of the overall total affected population. These vary by sector and, in some cases, by the specific target group. Some commodity needs are based on household sizes, individual beneficiaries and/or specific target groups, e.g., children with severe acute malnutrition. Finally, the duration of the risk affects the total need of a specific commodity.

The graph in *Figure* is quite similar to that in *Figure* 28 but takes this additional assumption into account and shows the significant RUTF needs in Pakistan. To be prepared for 75% of emergency scenarios, a total amount of 370 Mt RUTF is needed. Preparing for needs beyond the 75% threshold is costly but would only add a small probability (15–25%) to also be fully prepared for the larger but very rare events. The sharp rise in the beginning indicates that every additionally invested amount prepares for a highly relevant risk scenario. The decline reflects the decreasing marginal returns in investing in pre-positioning. Moving to the second point would require an additional 360 Mt RUTF only to be prepared for an additional 15% of possible larger caseloads

Figure 31 – Resulting need for commodities based on the Monte Carlo simulation

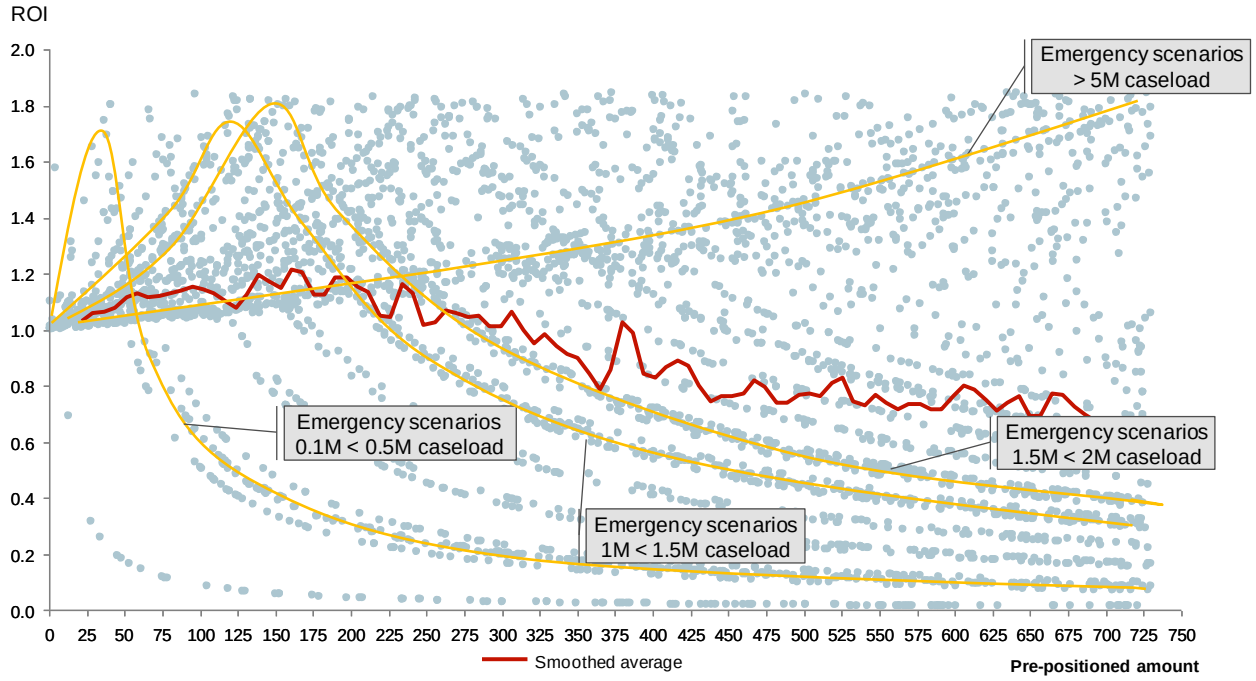


9.3. Details of sensitivity analysis

Figure 32132 summarizes all Monte Carlo simulation details to derive the optimal amount to be pre-positioned. The x-axis contains the randomly pre-positioned amount ranging between 1 and 730 Mt of RUTF.[35] Simultaneously, the effective need in each year was simulated, leading to the specific ROI value. The single realizations are represented by the dots in the graph. This initial dot cloud reveals some interesting trends, highlighted by the yellow lines. The one to left comprises all realizations with an effective caseload of less than 0.5 million beneficiaries. As the effective need in these cases is rather low, the pre-positioned amount quickly exceeds those needs, resulting in a low ROI. The two pyramid-shaped lines highlight the medium caseload scenarios between 1 and 2 million beneficiaries. In the last case, for the few large risk scenarios, the pre-positioned amounts are not enough to match the effective need. Thus, further pre-positioning for those cases would still increase the ROI. However, these cases are extremely rare.

[35] The range was selected to cover 90% of the possible needs that may materialize based on the earlier simulation results seen in Figure 31.

Figure 321 – Simulation details and smoothing of resulting ROI values



The red line represents the average ROI.[36] This approach allows to identify an optimal range of the amount to be pre-positioned for a given commodity. Comparing both approaches (the one included in the Excel model and the Monte Carlo simulations) we find that for Pakistan (with the broadest risk portfolio of all pilot countries) that the simulation arrives at somewhat higher values for the amount to be pre-positioned than in the Excel model, however further analysis is needed to confirm that implementing partner capacity would be sufficient to maintain fluid distribution of larger quantities without operational bottlenecks. For Chad and Madagascar (with more focused risks) the opposite is true.

[36] The simulation range was divided into 100 equally sized intervals.

10. DETAILS OF COMMODITIES COVERED

The focus of the pre-positioning was set to be around commodities in food, nutrition, health and WASH. The key commodities that were analyzed in the three pilot countries are shown in the illustration below. Under the DFID grant, no general food commodities were pre-stocked. However, the model allows for this option, as this might be important for many countries in the future. Additionally to those four groups, operational support equipment (ICT and MSUs) was included, as it is specifically important to those countries.

Figure 33 – Overview of commodities included in the model by pilot country

	Key commodities	Chad	Pakistan	Madagascar
Food	Rice	–	–	–
	Corn	–	–	–
	Wheat	–	–	–
	Pulses	–	–	–
	Oil	–	–	–
	Salt	–	–	–
	HEB	✓	–	–
Nutrition	RUSF	✓	–	–
	RUTF	–	✓	✓
	Micro-nutrient powders	–	✓	–
Health	Oral-rehydration salts	–	✓	–
	Zinc	–	✓	–
	Long-lasting insecticide-treated nets	✓	✓	–
WASH	WASH Family kit	–	✓	–
	WASH Hygiene kit	–	✓	–
	Water purification tablets	✓	–	✓
	Soap	✓	–	✓
	Bleach	✓	–	–
ICT	ICT equipment	–	✓	✓
Other	Mobile Storage Units	–	✓	✓
	Motorized boats	–	–	✓

Currently, no general food commodities were pre-stocked.
However, the model allows for this option

– Not pre-positioned ✓ Pre-positioned

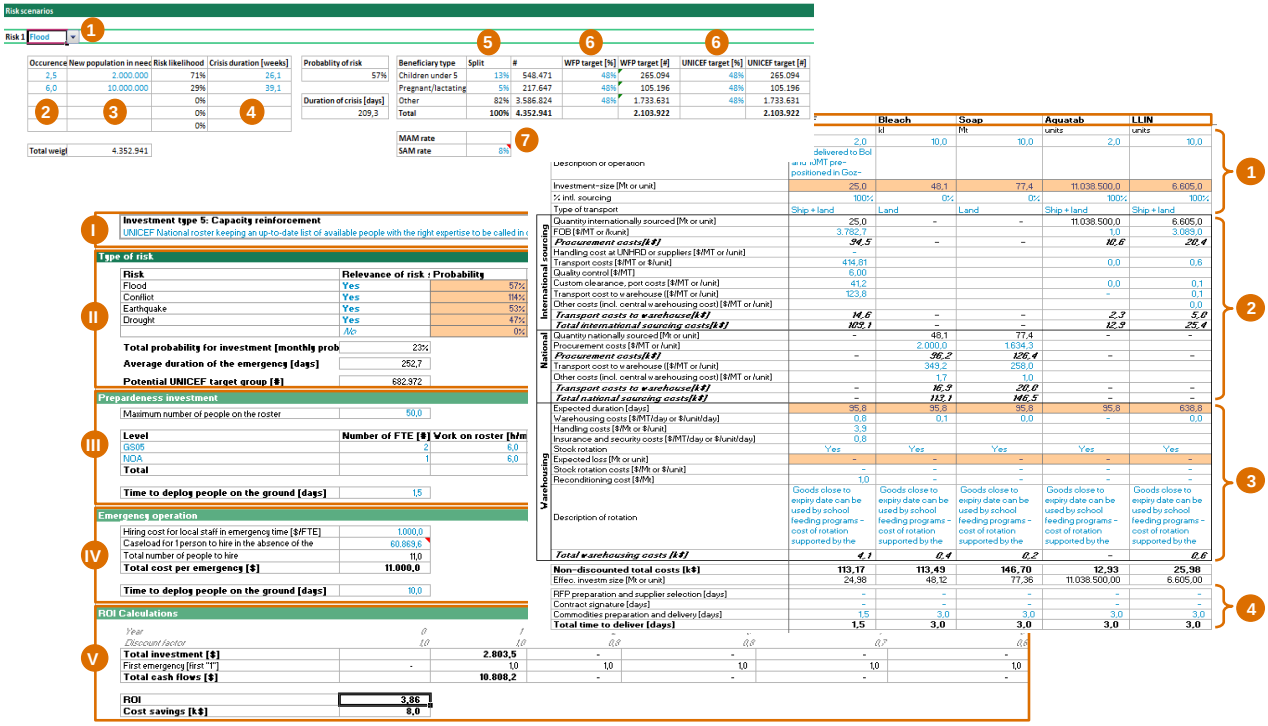
11. DETAILS OF UTILIZED MODEL

To support all calculations in this report, an Excel-based model was developed. It was tested for a Windows 7 Enterprise version with Excel 2007. The country-specific version was handed over to the respective country office. The model including a detailed user manual may be obtained upon request from the UNICEF/WFP emergency operations departments that led the efforts of this study. The model has been developed to be as user-friendly as possible. However, advanced Excel knowledge on the part of the user is still required.

The model is constructed around six different types of sheets:

- **Content and Sources**: Two first sheets explain the content of the model, the cell colour coding and the sources of all the input.
- **Output**: The output sheet summarizes all the results from the model.
- **Risk profile and Commodity needs**: These are mainly input sheets where the risk scenarios and the beneficiary needs for each key commodity are defined. Up to five different risk scenarios can be included, and the model provides for nine different types of risks: drought, flood, cyclone, economic crisis, conflict, epidemic, volcano, tsunami and earthquake.
- **Preparedness investments**: All the following sheets correspond to a specific preparedness investment (pre-positioning, training, etc.). These are the sheets where data related to each investment is computed and where cost and time savings are calculated.
- **Stock and Longer pre-positioning**: These two sheets only contain calculations for the pre-positioning investments. They allow the exact storage duration of the commodities to be taken into consideration depending on the quantities required for each emergency and on when the emergencies happen, and also to spread the investments over time. No input or manipulation is required in these sheets.
- **Infrastructure examples**: This sheet contains illustrations of cost and time savings calculations for different types of infrastructure work to help the users in the development of ROI calculations for infrastructure investments.

Figure 34 – Selected screenshots from the Excel-based ROI model



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14. ACRONYMS

ADES	Agence de Développement Economique et Social
AFDI	Agriculteurs Français et Développement International
ATR	Regional Technical Assistant
BCG	The Boston Consulting Group
BNGRC	Bureau National de Gestion des Risques et des Catastrophes
CARE	Cooperative for Assistance and Relief Everywhere
CCC	Core Commitments to Children
CELIAF	Cellule de Liaison et d'Information des Associations Féminines
CO	Country Office
CPC	Corps de Protection Civile
CSSI	Centre de Support en Santé Internationale
C&V	Cash and Voucher
DSA	Daily Subsistence Allowance
DFID	Department for International Development
DRR	Disaster Risk Reduction
EPRP	Emergency Preparedness and Response Planning
EW	Early Warning
FAO	Food and Agriculture Organization
FLA	Field Level Agreement
FTE	Full-Time Equivalent
HEB	High Energy Biscuit
HPM	Humanitarian Performance Monitoring
HQ	Headquarters
IASC	Inter-Agency Standing Committee
ICT	Information and Communication Technology
IRC	International Rescue Committee
LLIN	Long-Lasting Insecticide-Treated Net
MAM	Moderate Acute Malnutrition
MIRA	Multi-Cluster/Sector Initial Rapid Assessment
MSF	Médecins Sans Frontières

MSU	Mobile Storage Unit
NOC	Non Objection Certificate
OCHA	Office for the Coordination of Humanitarian Affairs
OPAD	Organisation pour la Promotion et l'Appui au Développement
PDA	Personal Digital Assistant
PCA	Programme Cooperation Agreement
PHO	Probability of Hazard Occurrence
PRRO	Protracted Relief and Recovery Operation
RFP	Request For Proposal
ROI	Return On Investment
RUSF	Ready-to-Use Supplementary Food
RUTF	Ready-to-Use Therapeutic Food
SAM	Severe Acute Malnutrition
SID	Secours Islamique pour le Développement
UAV	Unmanned Aerial Vehicle
UN	United Nations
UNDP	United Nations Development Programme
UNHAS	United Nations Humanitarian Air Service
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UNISDR	United Nations International Strategy for Disaster Reduction
VAM	Vulnerability Analysis and Mapping
WASH	Water, Sanitation and Hygiene
WFP	World Food Programme

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