EUROPEAN COMMISSION
DIRECTION GENERALE POUR L'AIDE HUMANITAIRE & LA PROTECTION CIVILE
Regional Support Office for East and Southern Africa (Nairobi)

RAPPORT DE MISSION

Sujet : South Sudan WASH RSO Mission (Cholera/Hepatitis E & RRM & WASH in camp)
Auteur: Jerome BURLOT (WASH Adviser/RSO Nairobi)
Date: Du 03 au 15 août 2014

Main partners and visited sites list:

Malakal and Wau Shiluk:

- UNICEF: Koji Kumaru (WASH Specialist Malakal); Philip Otieno (Flying WASH Specialist)
- IOM: Patrick Mutonga (WASH PM), Thuy Thran (CCM)
- SOLIDARITES INT.: Kevin Bonel (EPR Coordinator), Florent XXX (Emergency WASH Specialist), plus various staff
- MEDAIR: James Ray (WASH Advisor), Faustino Valera (Hygiene promotion), plus various staff
- CARE: Sasi Luxmanan (Field Co)
- InterNews: Jean Luc (video maker), Philip (sociologist), Stijne Aelbers (Team leader)

Juba:

- ACF US: Jack Otieno Odongo (Wash Coordinator); Murindi Taru (Wash Project Manager); Robert Mori (Hygiene promotion supervisor); Henry Acidry (wash Deputy PM), Samuel silo Rojas (Construction supervisor), Julie XXX (consultant epidemio)
- SI (Solidarites Int.): Kevin Bonel WASH and EPR Coordinator
- IOM: Antonio And various partners staff and cluster

Mingkaman and Ahou:

- Intermon Oxfam: Javi Aldama (WASH PM) and his staff, Claire Marena (Emergency Coordinator), Nicolas (protection)
- WASH Cluster: Christina Lopez (Focal point)
- IRC: Chris Kimonya (WASH PM), Tom Ogello (FieldCo).
- NRC: Melchizedek Malile (Emergency Program Director), Harry Nyatsanza (WASH PM) and his staff
- MSF CH: Fran (FieldCo); Greg (Log tech); Samuel (WASH)
- UNICEF: Daniel Odonge (WASH Specialist, based in Juba)
- WHO: Nebiyu Sissay (WHO field representative)
- ACTED: Lauren Mc Carthy (deputy CCM)

Specific attended meeting list:

- WASH cluster meeting Malakal, led by UNICEF WASH Specialist Kodji Kumaru
- Meeting in Juba with the WASH Cluster focal point Malakal Rainer Gonzalez (IOM) and the WASH cluster coordinator Jesse Pleger
- WASH cluster meeting, task force cholera in Juba, led by UNICEF Silvia Ramos
- Meeting with UNICEF WASH Chief of section
- WASH cluster meeting and meeting with the Commissioner in Mingkaman

Appendices list:

- 1: Detailed technical recommendation by partners and by sub sector
- 2: Detailed on IOM technical problem with pump and pipe selection
- 3: Hepatitis E Mingakaman WASH cluster action plan
- 4: Impact study about action of chlorine on rotavirus (HEV[1])
- 5: Presentation of Inter News INGO
- 6: Presentation of Dunster latrine for acute emergency propose by MEDAIR

[1] Hepatitis E (HEV) is a rotavirus

❖

Table of Content

1. EXECUTIVE SUMMARY

The priority of the mission, object of this report was to ensure a technical quality monitoring of the partners achievement within the framework of WASH ECHO funded project.

The purpose was to have an overall idea of:

- the global and WASH situation,
- the level of completion (mainly in quality aspect) of funded project,
- the main challenges faced by the partners,

The main expected output was to issue detailed technical recommendation to the partners to improve the quality of the response and prevent from potential major failure or delay.

The mission enable to visit the POC site of Malakal and settlement of Wau Shiluk (cholera response), Juba (UN House POC), the intervention in Urban Juba county (Tongping and Camp Coco), the settlement of Mingkaman and IDP's camp of Ahou. The plan to visit Maban has been canceled during the mission after clashes happening over there between communities. The plan to visit Maban was replaced by more substantial visit in Juba.

The main sectors monitored were:

- ✓ WASH intervention in IDP's and refugees camp or settlement (permanent activities and RRM)
- ✓ WASH cholera and hepatitis E emergency response

At the period of the visit the cholera outbreak was at the end of epidemic tails, and most of the activities were more or less phasing out. Analyze of the epidemiological curbs with the date of WASH response implementation in most of the affected site visited shows inclination of the curbs. It does not demonstrate the efficiency of the response but it is one tangible element to take into account when assessing the impact of the response.

Nevertheless, in Mingkaman 81 hepatitis E cases has been recorded since March this year, with a pich in June and early July. The incubation period of hepatitis E being between 4 to 8 weeks, we can suspect a coming back of a pick in few weeks. The problem regarding WASH response for this disease is that the dynamic of the different strains are not well knows and the way to tackle the disease is as well not clear with different studies giving different statement. Thus, during the visit all the WASH and Health partners have been requesting to start asap development of an action plan (draft in appendice). The lethargy of WHO in front of this outbreak risk is quite incomprehensible.

The evolving of the situation and intention of people in terms of displacement was one of the main issues encountered to plan, implement and size the response. As well, the technical constraints from the natural environment, the tricky security context, the human resources, and the logistic, affect the quality of the response.

Main issues discussed were about:

- ➢ exit strategy and need of harmonization of the incentive payment of community "volunteer",
- ➢ phasing out as much as possible of water trucking,
- ➢ mid term solution to phase out or decrease the resort to desludging,

- the need of adaptation to the context and harmonization of hygiene promotion tools and strategy, as well as to enhance briefing of the promoter and develop reminder
- the obligation of the partners to produce appropriate technical documentation prior to implement water supply project,
- the caution and need to enhance strategy for solid waste and sludge disposal,
- need to secure privacy at bathing unit and latrine,
- capacity to scale up or down the response according different situation and needs evolving assumptions made by partners,
- plan for improvement and operational strategy development

However, in general the level of quality ***performance*** of the partners is ***low*** and sometime ***NOT acceptable***.

Partner's overview:

SOLIDARITES INT. and Intermon OXFAM have been the most relevant partners so far, especially when it comes to technical WASH activities such as water supply system, with even some relevant initiative.

IOM and IRC have revealed very low quality level of achievement, especially when it comes to water supply system. Serious breach to technical basic rules, non-conformity and default have been noticed at design and monitoring level as well as at implementation or operating stage. The level of proficiency of the field staff is very low and deserves much more involving from "senior" staff at national level.

ACF US quality level of performance was also quite low, especially the logic of intervention and the operational strategy; the technical mastery of the technical staff, the criteria of beneficiaries selection, the method of targeting and sizing their actions, and the relevancy of some of their activities ("training" of water committee members).

NRC and MEDAIR mainly in charge of sanitation and hygiene promotion and RRM for MEDAIR, demonstrate an acceptable level of performance and a certain capacity to analyze and think forward the project at senior staff level (as SI and Intermon Oxfam).

UNICEF and cluster level of performance is also low, serious HR issue. Furthermore the role of UNICEF and the cluster is not clear and confuse who is in charge to provide technical support to the partners and ensure the global quality and technical coherency of the response.

The level of LRR approach in terms of WASH is very low in South Sudan, for sure the context is not the most appropriate for development project and heavy investment. Nevertheless, discussion and synergy should be impulse to initiate a common strategy for future cooperation. Attempt should be made at short term to implement pilot scale project (*construction of small scale water supply system, rehabilitation of school…)* to reduce the risk of failure in the porential investment. Those attempts will enable to produce lesson learnt and to develop more practical approach and more concretize partnership.

2. BACKGROUND TO THE EVENT

2.1. General situation of South Sudan

The harsh climatic conditions inducing droughts, floods and epidemics, and a complex dynamic of insecurity and violence continue to result in significant displacements across the country and increase the vulnerability of the already fragile population.
South Sudan is a young country; create after the longest civil war in Africa, with highly vulnerable populations and very little state resources. It must face as well several sources of crisis: floods, local conflicts, epidemic outbreak, and refugees from neighboring countries. The recent context evolutions, initiated in December after the coalition Nuer / Dinka that ruled the country collapses, causing fighting and creating a split of the country emphasized the existing problems with almost one million of IDPs in the country.

In addition, external factors like the continued violence in the border regions of Abeyi, South Kordofan and Blue Nile in Sudan, have generated influxes of population crossing the border to seek refuge and assistance in South Sudan. The States bordering Sudan are hosting 84% of the total refugee population.
The arrival of refugees has significantly disrupted host communities' coping strategies. As of September 2013, UNHCR recorded 224,150 refugees in South Sudan, 85% arrived in 2012 and 120,446 settled in Upper Nile amongst a host community of around 40,000 people. According the CAP 2014-2016, the number of refugees in 2014 should rise up to 270,000.
Considering the on-going conflict in South Sudan and in Soudan that creates a general instability as well as large scale displacement and the poor living conditions of a population that has little capacity to absorb shocks, high levels of needs will persist in a mid-term perspective.

2.2. Malakal POC (WASH in camp) and Wau Shiluk (RRM Cholera response)

2.2.1. Problematic

Following the fighting in Upper Nile State in December 2013, an estimated 8,000 IDPs took refuge in UNMISS compound in Malakal. This number increased to 23,000 IDPs in February-March. However, 6,000 IDPs moved to Nassir when Malakal town was taken over by SPLA IO[2].

Malakal displacement of population starts in 26th of December 2013 following heavy fight between the SPLA[3] and SPLA IO in Malakal town. The town population seeks refuge in UMISS compound during a night influx. During the month a lot of movements (especially Shiluk communities) have been noticed from and to the POC[4]. Numerous displacements went also to Wau Shiluk (with emergency intervention of MEDAIR for HP[5] and sanitation and SI for water supply, January 2014). Since fight occurred around Wau Shiluk in February, INGO had to leave the place for security reasons. UNMISS compound isn't built to become a displaced camp; thus, their authority put pressure on the NGO's to relocate the people. For this purpose sector outside the camp have been prepared to provide basic services to IDP's.

[2] Nuer fraction of SPLA
[3] Government fraction of SPLA (mainly Dinka)
[4] POC is a settlement of displaced people within a UNMISS compound
[5] Hygiene Promotion

The New POC was initially planned for a population of approximately 10,000–12,000 individuals. The new site was ready by mid-May, the actual relocation started on 31st May with the arrival of Rwandan Battalion providing security.

This relocation exercise is part of the Camp Coordination and Camp Management (CCCM) Cluster strategy to decongest PoCs (push by UNMISS to take over their premises but necessary anyway) and improve the provision of basic services including protection, sanitation and health access for thousands IDPs. The strategy also takes into account scenario planning of IDP living spaces that mitigate the threat of endemic waterborne diseases during the rainy season. Nevertheless, the recent flood happening in mainly in POC 3, 4 and 5 obliged the CCM to move more people and more quickly than planned. Now the relocation, after the flood, consists in decreasing the space between the shelters to find room in the ready sites to move sinister population.

Today remain only two POC inside the UNMISS compound mainly populated by Nuer.

2.2.2. Profile of population and potential displacement

For the time being, in the camp are mainly living Dinka ("who fear a coming back of the rebels") and Shiluk, and about 30% of Nuer (who fear the government soldiers). The Shiluk stay close to their property and especially to benefit from the humanitarian relief, as they are from the place and they don't have problem with Dinka. Furthermore, most of the partners share their suspicious of multi record of some family in several distribution sites. The big increasing of the displacement to the POC was in February and March, the first distribution of WFP in March (it could be interesting to get the evolving of IDP's incoming in the POC after delivery of food).

Today the trend in terms of population in the POC/sector is pretty stable with a very slightly decreasing since May 2014 (18 033 pp) to now august 2014 (about 17 000 pp). More likely, the population figures will not changes a lot during rainy season and Nuer are somehow trapped in the POC for the time being.

Most of the people living in the POC and sector are coming from Malakal town but the composition of the population in the Malakal PoC has changed according to the conflict dynamics, as control of Malakal town changed hands (between SPLA and SPLA-IO) several times from December 2013 to April 2014 . The population from originally from Malakal should therefore at some point wish to go back to their close place, especially the Shiluk.

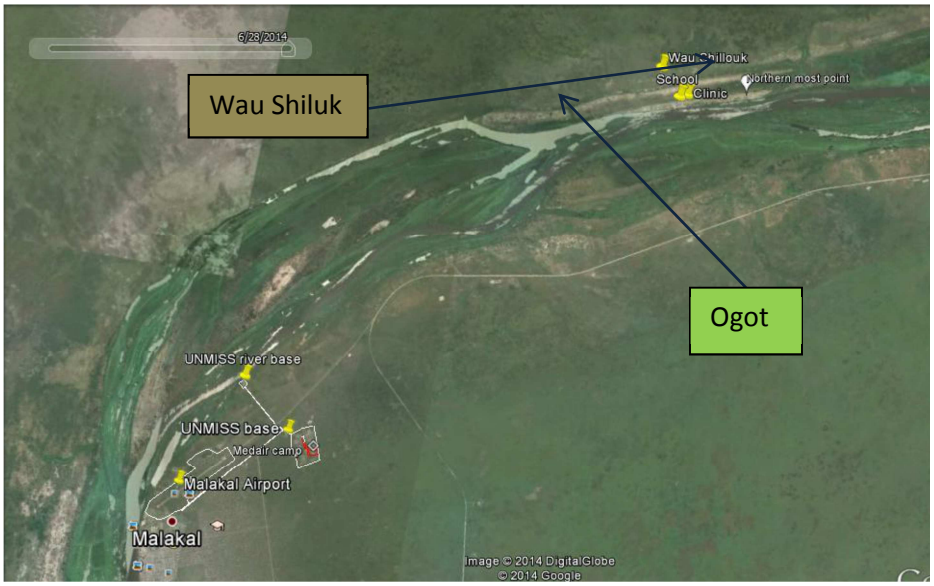
Parts of the displaced people in Wau Shiluk are rural population from surrounding villages, and the rest people from Malakal town.

One of the tricky point of Malakal situations is the presence of 3 different tribes and especially presence of Nuer and Dinka.

It is relevant to note as well as that traditionally in South Sudan few movements happen during the rainy season, most of the time movement happen during the dry season (starting from October).

2.2.3. Epidemic outbreak risks situation

Furthermore, the area had to face a cholera alert on 30 of June 2014, with a pick of more than 120 cases on the 5TH Of July. Cases where mainly coming from Wau Shiluk with after more accurate provenance analyze of the case, show that the main source of cholera cases was a small village next to Wau Shiluk named Ogot. Suspected cases have been recorded at the POC sites but no outbreak occurs in the camp where partners were mobilized and took actions to prevent it.

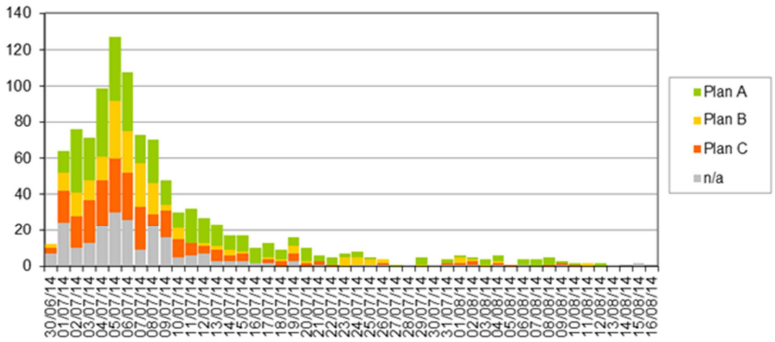


The Upper Nile state declared for: (Cholera situation overview as of 3 August, source: UNICEF)

- Wau Shiluk: 878 cases, with 17 deaths.
- Malakal PoC: 60 suspected cases, with 2 deaths (with few cases from Malakal town).
- Other sites in Upper Nile: 54 cases, with 2 deaths

The outbreak of Wau Shiluk area has been contained and NGO in charge of RRM such as MEDAIR and SI react in time to implement the response.

Today, the number of cases decreases a lot, 6 cases at the UPC of Wau Shiluk last week (week 31) and no cases the week we were there (week 32). MSF is planning to phase out their UPC within 2 weeks whether no more cases recorded.



Admission at Malakal CTC according the level of dehydration update on 30/07/14, source: MSF-SP

One case has been recorded at Malakal POC Hospital (Week 31) coming from Malakal town and one was in progress of investigation (result was negative), no case week 32.

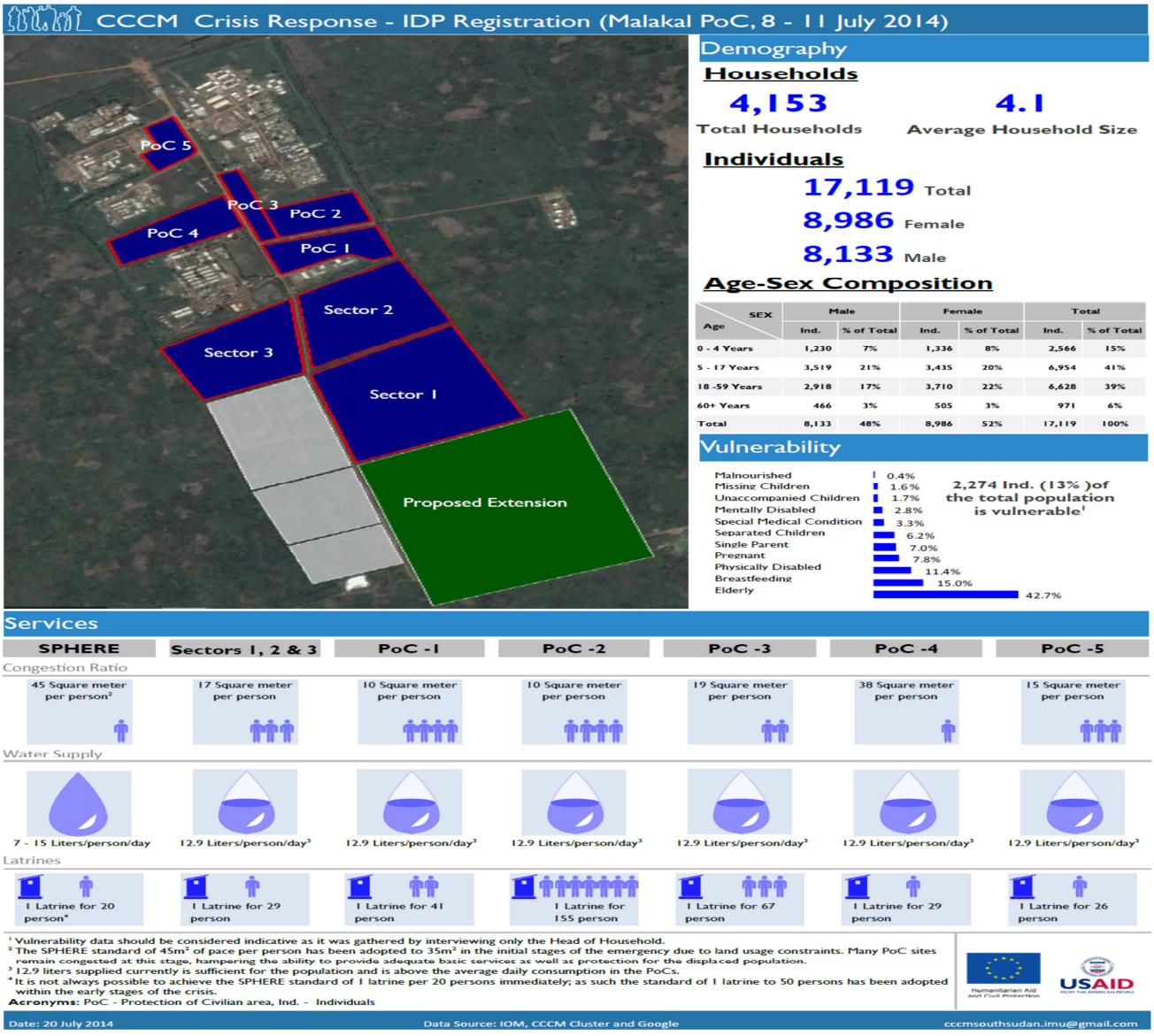
2.2.4. Miscellaneous: technical and strategic challenges; security situation

o Apparently the statement from the NGO's and UN agencies present during the presence of rebels, was that the behaviors of the rebels regarding the population and humanitarian actors was better than the governmental force in place for the time being.

Most of the source of information mentioned that rebels are still around. For sure, whether the agenda of the IDP's is not clear the presence of services in the camp and notably food distribution can create an artificial fixing of the people in the POC and sector.

- Technically the main issue face by the WASH actors in their response is the presence of black cotton soil with almost no seeping capacity and which make very tricky management of latrine pit and drainage…consequence need to desludge the latrine pit.
- Strategically the main issue is the willingness of people to contribute in the maintenance and management of water and sanitation facilities without high incentive payment.
- Most of the people in Malakal and around use to drink water from the river (although they used to have a water supply system in Malakal town but we can state that the water was not properly treated) and used to largely practice open defecation.

2.2.5. WASH Actors and situation



Age	Male Ind.	Male % of Total	Female Ind.	Female % of Total	Total Ind.	Total % of Total
0 - 4 Years	1,230	7%	1,336	8%	2,566	15%
5 - 17 Years	3,519	21%	3,435	20%	6,954	41%
18 -59 Years	2,918	17%	3,710	22%	6,628	39%
60+ Years	466	3%	505	3%	971	6%
Total	8,133	48%	8,986	52%	17,119	100%

We can note that on the above document the consumption of water per sector/POC is not very accurate, as it seems to be only an average on the whole camp (having in mind the lack of knowledge

and the outline of the water supply system we can be suspicious about their capacity to monitor the consumption). Last cluster update was at 14L/pp/day.

In Malakal POC /Sector partners in charge per sub WASH sector:

- *Water supply:* IOM
- *Sanitation:* IOM, World Vision, CARE, SI
- *Hygiene promotion:* IOM, World Vision, CARE

RRM WASH: MEDAIR and SI

Care and GOAL are acting in WASH more upstream on the river in Kolo and Rom notably.

2.3. Juba UN House and Tongping residential area (and Coco camp)

2.3.1. Problematic

The resurgence of a conflict since December 2013, affecting most of the country provinces and opposing the government of SSU ruled by Dinka ethnical group and a rebellion led by Nuer ethnical groups caused large scale population displacements and worsened the already critical situation described above, notably in terms of epidemic outbreak risk.

The conflict between Dinka and Nuer had for consequence the displacement of several decades of thousands of people seeking for protection within the UNMISS compounds mainly in Tongping and UN House. The large majority of the population of the POC are Nuer from Juba County, however we can find small group from various others South Sudanese tribes (such as Coco …), plus non south Sudanese nationality (mainly Ethiopian, Erythrean, Somalian). The people in the POC settle down by ethnic and family link, non-south Sudanese nationality people are separated from others.

The people who settle down in Tongping POC are in progress to be relocated in POC 3 of UN House (already about 6000pp have relocated and about 7 500 pp are still waiting for).
The intentions of the people living in POC are not really known but very link with the evolving of the situation at mid-term or long term. A significant number of non-south Sudanese, especially Eritreans, plan to move to surrounding countries (Uganda, Kenya), but most of the non-South Sudanese are waiting for a plan coming from the UN and would like to live under the UN protection or improvement in the politic agenda of their origin countries. The Nuer population could stay in the camp until the situation is stabilized which can take years and years if it is not decades.

2.3.2. Profile of population and potential displacement

The population of the 3 POC within UN House is TOTAL 23 816 pp (plus about 7 500 pp in Tongping POC):

- ✓ POC 1: 15 052 pp mainly Nuer
- ✓ POC 2: 2 295 pp (Nuer with about 1000 pp not south Sudanese, most of them illegal migrants and mainly coming from Bentiu, Bor, Malakal and Juba)
- ✓ POC 3: 6 469 pp mainly Nuer

In June, IOM start bio registration of IDP's from Tongping POC in Juba county, and the figures went from 21 000 pp to about 14 000 pp, means about 35% decreasing. The bio registration is in propress in the POC of UN House and the report should be issued by the end of august.

2.3.3. Epidemic outbreak risks

On 15 May 2014, South Sudan Ministry of Health (MoH) declared a cholera outbreak in Juba. 6th of May MoH recorded 18 suspected cases and 1 death, whom have been laboratory tested and confirmed (AMREF laboratory in Nairobi) as cholera. The first case came from the POC in UN House (cases where coming from various area of Juba county).

Table 1. Summary of cholera cases reported in Juba County, 23 April – 6 August 2014

Reporting Sites	New admisions today	New discharges today	New deaths today	Total cases currently admitted	Total facility deaths	Total community deaths	Total deaths	Total cases discharged	Total cases
JTH CTC	2	0	0	2	16	0	16	1426	1445
Gurei CTC (changed to ORP)	Closed 28 July				2	0	2	365	367
Tongping CTC	0	0	0	0	2	1	3	67	70
Jube 3/UN House CTC	0	0	0	0	0	0	0	85	85
Nyakuron West CTC	Closed 15 July				0	0	0	18	18
Gumbo CTC	Closed 5 July				0	0	0	48	48
Nyakuron ORP	Closed 5 July				0	0	0	20	20
Munuki ORP	Closed 5 July				0	0	0	8	8
Gumbo ORP	Closed 15 July				0	3	3	67	70
Other sites	0	0	0	0	1	14	15	1	16
Total	2	0	0	2	18	18	39	2105	2147

N.B. To prevent double counting of patients, transferred cases from ORPs to CTCs are not counted in the ORPs.

In response to the cholera outbreak, the MoH developed a cholera response plan and established a Cholera Response Task force which coordinates both health and Water, Sanitation and Hygiene (WASH) activities.

Source: WHO

Until the 6th of august 2 147 cases were reported, including 39 deaths, with two epidemiologic pick the first one on beginning of week 21, and the major pick with more than 100 cases in a day was at the beginning of week 22.
The week 31, 4 cases *were reported from Gumba and 4 others cases from POC 1 in UN House. The epidemic outbreak is d*escendant for several weeks (small pick on week 30) and now the actors follow up the end of the epidemic tail (no case recorded in Juba County at the beginning of the week 32).

2.3.4. Miscellaneous: technical and strategic challenges

Out of the POC in the urban center, the targeting of the response is undermined by lack of accurate data regarding the provenance of the cholera cases. The result was a not cost efficient response and potentially gap in needs.

The level of dehydration is not presented by WHO and the various cluster in charge of cholera response (Health and WASH). Only MSF can provide this type of data which can be relevant to assess impact of the WASH response and especially hygiene promotion, usually very tricky to assess. Nevertheless, the data presented by WHO show high decreasing of the mortality rate after beginning of the response. In most of the case, we can observe decreasing of the incidence the following weeks after the WASH response (for instance: Wau Shiluk, the week after the response implementation).

2.3.5. WASH Actors and situation

A geographical division of areas in Juba City has been agreed, under the WASH Cluster leadership. This divisions is: ACTED: Tongping PoC; Solidarité: UN House PoC; Medair: Muniki area A, B, C and Gudele; Oxfam: Ghabat, JTH, and Gumbo; PIN: Konyo Konyo; ACF-US: Tongping and southern extensions**;** PAH: Northern Bari.
Most of the water supply in POC is done by water trucking, few boreholes have been drilled but the yields found do not enable relevant supply from this resource up to now. Investigation is ongoing.

To note, that UNICEF is doing some kind of chlorination of turbid raw water in metalic tank of private water trucker without any monitoring (not very relevant), apart from WHO irregularly.

The water supply in Juba is mainly performed by water trucking, with a small part which benefits from a water network and others areas from hand pump. The quality of the water is not ensure, some truck deliver basically raw water (250L for 5SSP) and some chlorinated turbid water (250L for 6SSP). People in residential area have commonly latrine.

2.4. Mingkaman

2.4.1. Problematic

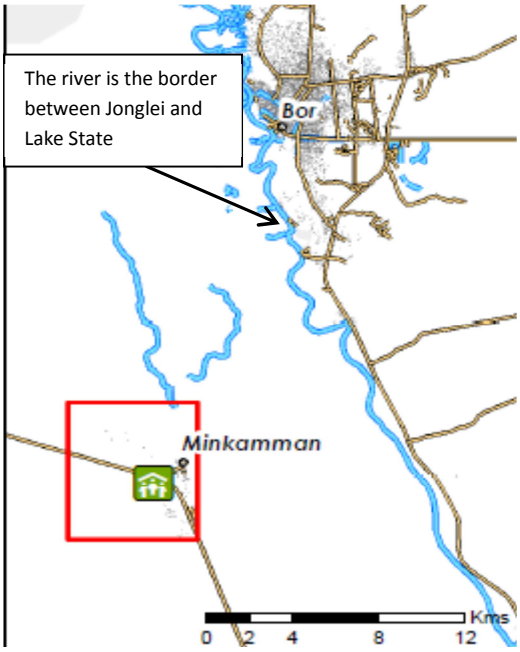
In general within the context of Mingkaman, all the WASH and Health partners have to develop asap a consistent and practical approach and capacity based on a detailed action plan to tackle risk of hepatitis E outbreak.

In mid-December 2013, IDPs began to cross the Nile River from Jonglei State to escape violence and a breakdown in security. Over the following three months, thousands of people continued to arrive, resulting in an estimated 85,000 IDPs in the Mingkaman area by mid-March. In late February, there was an increase in new arrivals related to fighting in Twic East County in Jonglei, but as of March 10, the number of people arriving daily has dropped significantly (IOM South Sudan Situation Report #17, 4 April 2014).

Humanitarian actors have been operating in the Mingkaman area since December 2013 with limited knowledge of the intentions of the IDPs present. At the beginning of the arrival, the host communities used to be very welcome for the IDP's . The rainy season should have started since April (usually lasting from April to August or September) in the Mingkaman area triggering the planting of crops by local community. As the population in the Mingkaman area swells, tensions are raising between newly arrived IDPs and host community members who want to begin the crops. The point is that the rainy season barely occurs this year and the rainfalls are too scarce to start crops.

The agenda of the host communities is a bit paradoxical cause in one way they want to keep IDP's there to benefit from humanitarian services and in one way they would like IDP's to move from their residential place because of the rainy season for crops. Actually, the host and displaced communities are not distinguished to access the relief.

2.4.2. Profile of population and potential displacement



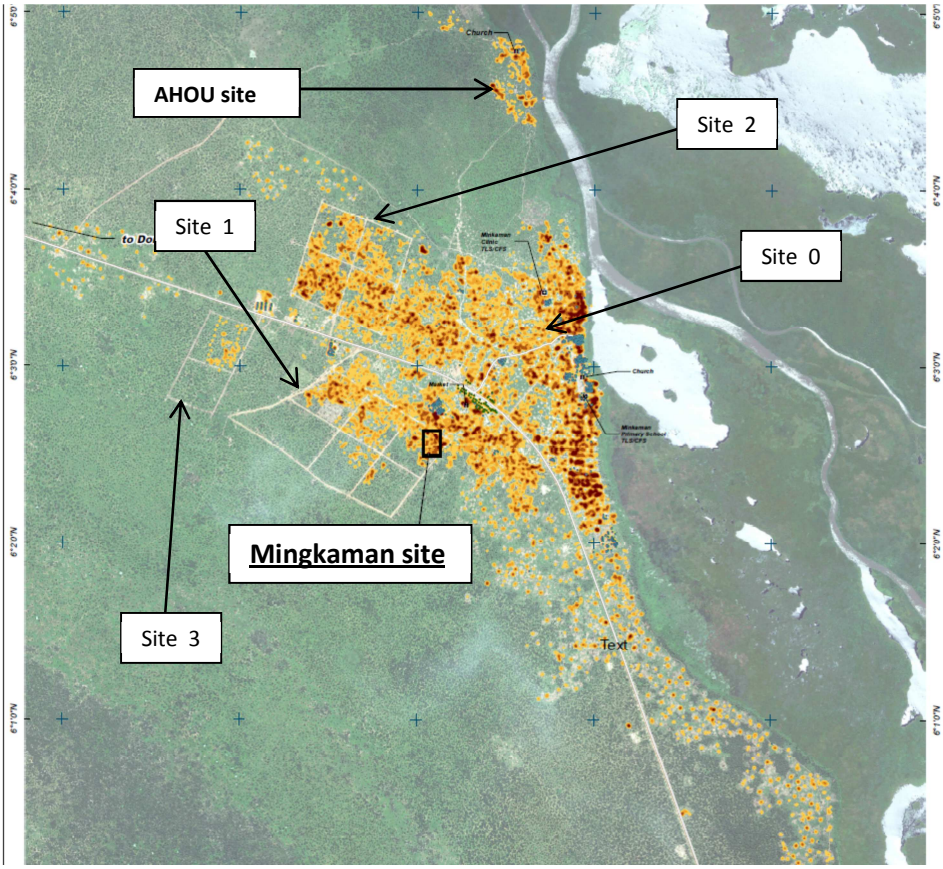
People displaced to Mingkaman are coming mainly from different counties of Jonglei state (and 1% from Awerial state, with fewer from Canal, Fangak, Pibor and Pochalla counties in Jonglei state.):

- *Duk county: 6%*
- *Twic East county: 14%*
- *Bor county: 77%*

The IDP's place in Mingkaman is neither called camp or POC but settlement as decided by the local authority, which means a lot regarding the agenda of local authorities relating the IDP's. The settlement is divided into 4 sites with 3 new

sites (site 1 with 6 sectors; site 2 with 4 sectors; site 3 with 2 sectors) for relocation and the initial site of IDP's settlement site 0 (with 8 sectors).

The initial host community was about 3 500 pp, when today and according source of figures the population is more likely between 60 000 to 93 000 pp. Most of the partners are highly suspicious with the figures of population number. The first registration made by WFP for the food distribution gave a figure of 93 000pp. However, this figure seems to be unrealistic and ***cross information like water consumption, density of population or counting of shelters should be used until a more proper and accurate registration (likely bio registration at some point by IOM)*** will be implemented. MSF's contractor (based in Vienna UNITAR) has developed a density of population map from aerial and satellite photos.



The result of the exploitation of the photos by the contractor's expert was an estimation of 13 492 shelters and 572 infrastructure or supported building, the final estimation of population based on the number of shelter and realistic density of population gave a figure of about 65 000 pp. The humanitarian actor mentioned that the pressure on the services are low compares to expected, based on the figures of 93 000pp. IOM bio registration is planned but no timeline.

<u>At time of the visit:</u>

- ***site 1*** planned to host 27 000 pp was filled at ***27%*** (7 062 pp),
- ***site 2*** planned to host 18 000 pp was filled at ***45%*** (7 907 pp)
- and ***site 3*** planned to host 9 000 pp was filled at less than ***15%*** (1092 pp)

The main argument received to ensure settling down of the large portion of IDP's and thus uses of the services implemented is related to the military strategic aspect of the area. Actually, the Lake state is mainly populated by Dinka and Bongo at the south west border of the state whereas on the others side of the rivers Bor and Jonglei state is mixed with Nuer and Dinka. The main access road are on the Jonglei side of the river and the Nuer territories on north of Jonglei when the north of Lake state is populated by Dinka as well.

Guidan is important military strategic place as it is the open gate to Juba in Jonglei state and this town/village is located North county of Bor. Thus, Mingkaman, separated from Jonglei by the Nile constitute a very appropriate refuge place for the Dinka from Jonglei.

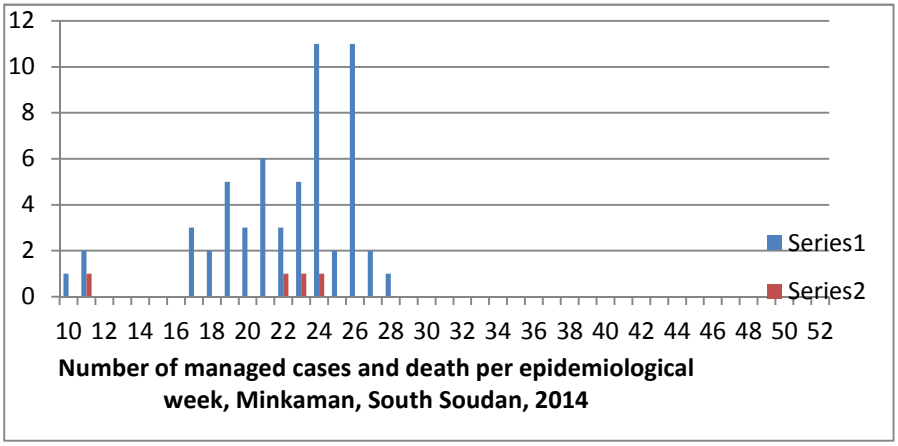
Mingkaman will remains one of the main refuge places for the Dinka, given the very volatile and potentially long lasting conflict situation of the country. That's the reason why you could make the assumption that there is sense to invest in basic services implementation in this location.

2.4.3. Epidemic outbreak risks

The other main issue of Mingkaman is the risk of hepatitis E outbreak with already 81 cases with 6 pregnant women since March week 10 and 5 deaths among them with 3 pregnant women and 1 baby (fetus). Hepatitis E is highly mortal for pregnant women.

The mains sources of contamination are:
- drinking contaminated
- Water and food contaminate notably by water.

The WASH response is pretty complex as the incubation period can go until 2 months (average 1 to 1,5 month) and especially the way to destroy efficiently the rotaviruses living in the water is not well clear. For instance, there is not clear technical guideline related to the most appropriate mode of water treatment. And the chlorination efficiency is put in question by some scientist, although there is almost no reference study on this topic. The way to perform chlorination in terms of concentration, contact time and mixing mode is not defined. Although some studies on various strains (but not all of them) mentioned very high concentration of chlorine (about 23mg/L during 60 a 180 minutes) and some others propose different conditions. Some studies mentioned that only UV system can have a reliable impact on rota viruses' destruction (***study*** about impact of chlorine on rota viruses HEV ***in appendice***).
That's why, prevention must be consistent and stressed to avoid unmanageable outbreak, for which the WASH response will be very costly.



Number of managed cases and death per epidemiological week, Minkaman, South Soudan, 2014

The level of reaction from the WASH and Health partners (including WHO and UNICEF) was pretty low, and the WASH cluster focal point had a lot of difficulty to issue an action plan as discussion were endless and without practical output. During the field visit of the sector 2 of site 0 were most of the cases are coming from, WHO and UNICEF representative have been requested to join and we could have a discussion on site about the response, their input was very theoretical, but it push them to face the problem.

The other main issue of Mingkaman is the risk of hepatitis E outbreak with already 81 cases with 6 pregnant women since March week 10 and 5 deaths among them 3 pregnant women, 1 baby (***see hepatitis E action plan*** developed by the WASH Cluster of Mingkaman ***in appendice***). Hepatitis is highly mortal for pregnant women.

The mains sources of contamination are:
- drinking contaminated
- water and food contaminate notably by water.

The WASH response is pretty complex as the incubation period can go until 2 months (average 1 to 1,5 month) and especially the way to destroy efficiently the rotaviruses living in the water is not well clear. For instance, there is not clear technical guideline related to the most appropriate mode of water treatment. And the chlorination efficiency is put in question by some scientist, although there is almost no reference study on this topic.

The level of reaction from the WASH and Health partners (including WHO and UNICEF) was pretty low, and the WASH cluster focal point had a lot of difficulty to issue an action plan as discussion were endless and without practical output. During the field visit of the sector 2 of site 0 were most of the cases are coming from, WHO and UNICEF representative have been requested to join and we could have a discussion on site about the response, their input was very theoretical, but it push them to face the problem.

2.4.4. Miscellaneous: technical and strategic challenges

Mingkaman is today the main spot for food distribution within the country and thus represent a very attractive place for anyone looking for food. The suspicious of multiple registrations is pretty high. In the camp is barely possible to find a man. The river enables a lot of movement for the population and frequent go and back to Bor is going on. Some NGO like Oxfam developed a strategy to be present as well in Bor and Mingkaman to be more able to monitor and understand the dynamic of movement and the risk of misappropriation of the humanitarian relief.

Most of the IDP's at their arrival settle down close to the river near the host community, in a prone flooding area (no flood occurs for the time being due to the lack of rain).

The mapping of prone flooding area is not very accurate as it is base only on observation and view GPS data recording.

To decongestion the area where IDP's settle down nearby the river and protect IDP's from flood hazard, safe area has been identified further from the river. The camp manager and partners plan the construction of 3 new sites located out of flood prone area. All the sites have been prepared to provide basic services at sphere standard to the IDP's. However, the IDP's were very reluctant to move, especially to the furthest site, site 3.
Thus, the situation become very tricky with investment made and all the services ready to be provided to the IDP's on those site, and the scarce movement of the people to populate those site and needs to keep providing services at the site named 0 (1st site of IDP's settlement) prone to flood and congestion in some part. The camp manager was thinking that the effectively of the services and the risk of flood

will be a sufficient argument for the people to move. However, the population is reluctant to move for three main reasons:

1. The attraction of the river (transport, natural resources, fishing…)
2. The protection issues for woman in most remote place where they have to go far to harvest fire wood
3. The attraction of a new market that appears spontaneously and very quickly nearby the river (200m)

Today, this issue of relocation is one of the main problems of Mingkaman-Ahou. The humanitarian actor had even to face people who settle down among the site (former and new), thus they decide to put in stand by implementation of the services in the new sites. In addition, the cluster partners decide to don't direct the services to the grey zone where people settled down, as otherwise the investment made in the 3 new sites will be wasted and people will definitely not move over there (the original might did not take enough into account the wish of the people).

The current strategy follow by the cluster and the actors is to keep services at low level in site 0, to put all activities regarding implementation of new facilities in stand by time to get more clues about the trends of movement within the population. The consequences is unbalanced repartition of the services which are usually much higher than the standard in site 1, 2 and 3 and more or less at the standard in site 0 according the sector (8 sectors) of the site.

2.4.5. WASH Actors and situation

Most of the people in Mingkaman and around use to drink water from the river (although they used to have a water supply system in Mingkaman town but we can state that the water was not properly treated) and used to largely practice open defecation.
On about existing 66 water points (including borehole with hand pump) 42 are chlorinated and monitored on daily basis.

The main WASH Actor in Mingkaman are:

Site	Sub sector	NGO's
0	Water suppy	Intermon Oxfam; MSF phase out and hand over to Oxfam
	Sanitation	NRC, ICRC, Intermon Oxfam
	Hygiene promotion	NRC, ICRC, HELP
1	Water suppy	RUWASA
	Sanitation	AWODA
	Hygiene promotion	AWODA
2	Water suppy	
	Sanitation	
	Hygiene promotion	Intermon Oxfam
3	Water suppy	
	Sanitation	
	Hygiene promotion	IRC
AHOU	Water supply	IRC
	Hygiene promotion	IRC, CRS

3. MAIN ISSUED DISCUSSED AND OUTCOME / COMMENTS

3.1. IOM

6.1.1. Performance global estimation

IOM in Malakal POC is in charge of the whole water supply of the POC/camp, plus part of latrine management and hygiene promotion.

Whether there is no major delay in the implementation of IOM project, generally and in particular, the quality ***performance of IOM is very low when it comes to technical project such as water supply system*** in terms of design as well as implementation and operating.

Clear and accurate information about the water supply system were very difficult to collect at Malakal site*. A lot of difference and confusion has been noticed between the existing very basic technical documentation, the information provided orally by the local IOM WASH Manager, the National WASH Coordinator, and the observation of what has been implemented, notably in terms of performance and technical outlines of the system.*

IOM show a lot of non-conformity in equipment and materials selection and set up, several breach to technical rules, as well as incoherency in the design and impressing lack of knowledge of the system implemented and the basic principles of a hydraulic system or treatment process at field level especially:

- Serious lack of adequate technical documents at field level
- Problem of pump, valve and pipe selection at river intake and on the supplying lines from the intake to the treatment plant.
- Problem of pump and pressure pipeline protection
- Lack of proficiency at field level but as well somehow at coordination level
- Problem of logistic and procurement process
- Pump planned to be installed and pipe installed cannot enable to reach the expected performance for the system
- Improper setting up of the treatment plant in a non-emergency set up (risk of flock pump into the network and wrong way to monitor water quality of the outgoing water.
- Problem of knowledge and skill to operate properly the pump station and the treatment plant
- Problem of water quality monitoring at HH level (always same value mentioned)
- Problem of performance of the system

The consequences of some of the issues raised can be majored damage in the network and the hydraulic equipment with need of new investment, short lifespan of the whole system, high running cost, rupture of the camp's water supply.

Those issues have been raised to IOM WASH Coordinator who is currently on the field to assess the problem and find solution. A technical report is expected by the end of the month.

6.1.2. Main issues discussed

With IOM the main discussion were about: the design of the water supply system; the water quality monitoring; the selection of materials and equipment; the performance of the system and its potential evolving; the constraint faced in implementation; the strategy of incentive payment with community volunteers; the relocation of the people, the coordination and the efficiency of the core pipeline; the phasing out (by the end of august normally) of water trucking (only operate for POC 1 and 2 for the time being); the problem of ground seeping capacity and desludging of the latrine pit; the objective of latrine (barrier on the route of contamination); the necessary dynamic and adaptation of hygiene promotion .

At field level, the lack of technical documentation and knowledge about the system but also about water supply system in general (dimensioning and protection, pump selection and operation…) undermined the capacity to have a proper technical discussion and collect accurate and reliable data. During the visit we had to guess the system.
Also, the lack of proficiency and not adapted staff profile jeopardize appropriate management of the system and then quality and sustainability of the services which is related to the public health.

However, the WASH coordinator seems to know his job (*a lot of technical documentation have been requested to him to ensure appropriate reaction to highlighted problem*) but he has to face a lack of capacity within the structure, as well at the level of support services (wrong pump delivery compares to original PO) and become overload and thus do not have any more the capacity to supervise the activities with consistence.

*Improper selection and operating of the pipe and pump for the intake (**more info in appendices**):*

The WASH staff of IOM on ground (so as well as coordination level) do not know that the type of pumps installed (22kW, means need of almost 100kVA to start one pump) at the river side do not match the type of pump initially planned (7,5kW) in the basic lay out. Furthermore, the WASH manager did not know that there is a specific procedure to start up the pump to avoid damaged on the system, and the WASH Coordinator did not provide it.
This is NOT acceptable at the level of the WASH manager on ground, but at all level. You can receive a wrong pump, it happens, but you cannot install it and check nothing until someone come and notices it. So, in both case there is a serious issue and a concern regarding resistance of the pipeline and securing of the permanence of water supply.

1/ The main constraint take into account by IOM to design the pump station and pressure lines from the river intake was the limited transport capacity. According IOM, the only pipe they could transport at this time was the HDPE DN 63mm because according them it is the bigger diameter transportable rolled on a drum, but you can find it until DN 90mm. For same difference of altitude the difference in terms of hydraulic loses (related to the energy need) is that you can flow 25m3/h with about 5 bars pressure with DN 90mm, when at maximum you can flow 12,5m3/h with about 10 bars pressure.

2/ In any case, the pump selected and ordered (DMS 12/5) in terms of flow is too weak to reach the assumption of 400m3/day[6], and with characteristic over 10 bars, means inappropriate for the selected pipe pressure resistance threshold (*Proper selection the pipe NP of should be quite higher in most of*

[6] See estimation of the needs in appendice (IOM pump and pipe selection)

the case than the pressure planned in the pipe) . In addition, no calculation of the pump working/operating point[7].

3/ whether they could not transport pipe with diameter over DN 63mm they could select more appropriate NP/PN[8], like 12,5 or 16 bars

4/ At the end, the pump which has been installed is not the one ordered and nobody notice it. The pump installed was the heavy DMS 25/5 much more powerful working at 22kW which means to need of almost 100kVA to start up the pump and two have been installed so almost 200kVA to start it in the meantime (when the generator used is an UNMISS one of 500kVA but presenting a lot of breakdown, and the backup generator is only 150kVA). This pump is also normally working at much more pressure than 10 bars and then risk to damaged (the pipe 9max 10 bars).

The difference of altitude between the river and the treatment plant location should not be over 8-10m. The need of pressure is low but the demand on flow is pretty high, according the plan of 400m3/day the two pumps should flow about 25m3/h each during 8 hours. Normally you select your pump and your pipe by compromise between energy consumption and the expected performance from the system.
Out of problem of equipment availability and logistic, the type of pump should have been helical centrifugal (less energy consumption and enable to provide high flow with low pressure) rather than the one IOM installed which is centrifugal radial (much more energy consumers for this type of characteristics: high flow and low pressure need) but then the pipe should have been DN 90mm, ideally DN 100.

Improper hydraulic montage at the river intake pump station and no hydraulic hammer protection have neither be implemented nor even planned.

The equipment selection was very improper for the valve notably given that the valve will install on a pressure system with risk of hydraulic hammer gate valve with ¾ of round to be closed are forbidden to be set up especially around a high pressure pump.

The setup of the different hydraulic equipment presented also a lot non conformity and for instance high pressure pump did not have any protection at the river..

Improper set up of the new water treatment plant:
The new treatment plant has been "designed" almost as an emergency set up. Still coagulation, mixing, flocculation and sedimentation are operated in the same water tank (onion tank 75m3). The raw water inlet to the sedimentation tank is on the top of the water tank and the outlet is located close

[7] It is the point on the pump curve where the system back pressure at the pump discharge intersects the pump flow rate (variable with discharge pressure).
The operating point is important as it defines the operating hydraulics of a piping/pumping system. You want to know the expected flow/pressure/energy required for a system before you spend the time and capital to install the system.
The pump curve is defined by the pump manufacturer through flow testing of the impeller/volute combination. It is not a calculation.
The system curve is found by calculating the flow friction losses in the system, exclusive of the pump, and plotting flow vs friction loss.
[8] NP/PN: nominal pressure is the maximum pressure resistance of the pipe to ensure long lasting normal used

to the bottom and connected to a pump and a chlorination dosing equipment. In consequence, high risk to pump flock with aluminum sulfate (and eventually hidden pathogens) into the network and thus consumption of the chlorine inject just after the outlet.

IOM had already select one technical solution to remedy to this situation in fine tune the treatment process. They plan to install a unit of low pressure ultra-filtration membrane (the aspect of low pressure presenting an advantage in the context).
Theoretically, it could be relevant. Nevertheless within the context the risk of clogging of this type of system without pre filter before (which add again one more equipment), the maintenance requirement (even they mention very easy maintenance on their notice) and thus the frequency of back wash compares to a basic slow sand filter or even quick sand filter are pretty high, or even maintenance of a cartridge polymer micro fliter.

The main objective of improving the existing water treatment process should be the removing of flock from the water inject to the network (better hydraulic set up, sand filter or cartridge polymer micro filter should be more appropriate). No need of a fancy system reaching European standard for short time and then collapsed, leaving people to their former raw water resources, with loss of their immunity. The treatment process and equipment has to be basic and robust, no risk to be taken in.

Miscellaneous:
The ongoing direct pumping into the distribution network because of lack of natural slop to ensure appropriate pressure at taps, is planned to be phased out after ***implementation of 6 elevated water tank*** (volume??) planned to be installed by IOM in the next month.

The backup capacity for generator was planned at the storage tank but one of the generator had to be implemented at the treatment plant, as finally UNMISS decide to don't provide energy as initially planned.

Regarding the emergency water supply system based on water trucking to supply the water point: The system is phasing out, 4 trucks are still working (especially for POC 1 and 2) but normally IOM mentioned that ***the water trucking should be totally stopped the latest at the end of august***.

Note on hygiene promotion and accountanility:
IOM fund an INGO named ***Inter News (presentation flyer in appendices)*** to work on accountability, communication and community mobilization as well as hygiene promotion. The initiative is quite relevant and they have a lot of very interesting *communication materials in the local language like prerecorded audio message, video, etc.. to address different type of public health, accountability, community mobilization problematic*. Although during a discussion the sociologist of the NGO's propose to play on the competition feeling of the population to organize a competition of the "mother of day".
We have to share a concern *that the competition feeling in the area* (furthermore we have there Dinga, Nuer and Shiluk community) *can drive the communities to fight each other's with weapon*, and this type of initiative should be taken very carefully to avoid any uprising.

Implementation of “hygienic home” label that everybody whom wishes could reach according different criteria and a process of monitoring could be safer.

6.2. SOLIDARITES INTERNATIONAL

3.1.1. Performance global estimation and activities outline

SI in Malakal POC is the main actor for sanitation and is doing also some hygiene promotion. In Wau Shiluk they intervene with their Rapid Response Mechanism after the influx of IDP’s in January and after the Cholera outbreak beginning of July. In Juba, SI is in charge of water supply (water trucking mainly), part of sanitation and part of hygiene promotion (with various others actors) in POC 1 and its extension and 2.

The global level of performance of SI within the context is pretty acceptable.

In Malakal, most of the latrine are clean and hand washing facilities effective. The camp/POC apart the place flooded the week before, is clean, no garbage spread away. Nevertheless, this as a cost as in Malakal as well as in Juba community workers are paid to clean latrine, filled hand washing facilities collect garbage from the small containers to the disposal truck.

*For information, In Malakal POC **81 pp** paid 25SSD/day/pp are in charge to **clean the latrine** and filled the hand washing facilities with water, means about 15 000USD/month and 180 000 USD/year for one category of community workers. In Wau Shiluk, **80 Hygiene promoter** paid 45SSP/day/pp, means about 28 000 USD/month, and 332 000 USD/year. So, for two categories of community workers in two sites, we have a total budget needs **over half millions of USD/ year** for incentive payment.*

The solid waste disposal site is few hundred meters from the camp, but the wastes are just dropped, no incinerate (to be stabilized and reduce risk of vermin) and no buried. The sludge from the latrine pit is disposed in a pond next to the garbage disposal site.

3.1.2. Example of issued discussed

The main issue face by SI is the presence of black cotton soil (which goes pretty deep over 10m)which has almost no seeping capacity and the site is flat, those parameter make the drainage and the management of the latrine technically tricky and costly (need of desludging which is and endless activity).

The pit of the latrine will have to be desludged at some point according the dimensioning of the latrine pit. In average latrine pit has to be desludged every two weeks using 3 trucks (one fund by UNICEF), which in terms of sustainability consist of a serious challenges and will be very costly.

For instance the price of one trip of desludging is 450SSP (112USD)/4-6m3 of sludge, average 7 trips per by 3 trucks per day, means about 2360USD/day, ECHO Fund 2 trucks means 1575USD/day and about 45 000 USD/month, more than half millions of USD per year

During the rainy season the access to latrine for desludging is infeasible at some point, despite this is the moment you need the most. The drainage of the camp (rain water) is also a tricky issue as the place is pretty flat and no infiltration.

Those problems are enhanced by the misused of the latrine as bathing facilities and thus quick filling of the pit and need of desludging.

In terms of emergency response, the reaction time when happen the outbreak in Wau Shiluk was good, 48hours to be on ground and start activity. Few improvement should be made in the process of water treatment (as all the partners dealing with it), the fletching site, and in the training of the staff in charge of disinfection of HH and hygiene promotion. Otherwise, during the outbreak SI implement 13 ORS point with light to see it during the night and contribute to protection.

In Juba (un House POC), SI must ensure privacy in bathing unit and latrine (especially at POC 1), as some men have ripped the plastic sheeting to watch the women (??). Some location of latrine should be reviewed to avoid this type of problem.

Rivalry between communities (Nuer and non South Sudanese) in Juba POC is also a serious issue to take into account as tough fight occurs from time to time.

In POC 2 SI took over from Oxfam the management of the water supply system which has a lot of default: leaks, inappropriate pipe materials, pipe not buried, and drilling not giving expected yield.

In terms of activities SI have no major delay in the achievement and most of the results are reached. They even have done more than planned, for instance improvement of the drainage channel in Juba POC 2. The contingency measures against cholera are pretty well implemented, during the visit systematic disinfection of shoes and hand is done at all entry point of the POC in Juba.

One of the main quality problems was the fact that most of the latrine had no cap, and no insect proof screen, so cannot constitute a barrier on the route of contamination. Some latrine block in the camp had opening to the pit which should be backfilled to avoid water and vermin intrusion.

The Emergency WASH manager and the WASH / EPR coordinator (leaving in September) are pretty good, they are very transparent in the discussion and had a good technical analyze, trying to find solution to improve the services provided. They should now think more strategically to propose exit strategy and improve the cost efficiency of the response.

*The **cost of the boat to go from Malakal to Wau Shiluk** is incredibly high, about 400USD/trip, means about 800USD for just go and back once, and means **minimum 24 000USD per months**. SI will get their own boat.*

6.3. MEDAIR

3.1.3. Performance global estimation and activities outline

Medair have a RRM team working mainly in Wau Shiluk after the influx of IDP's in January and after the cholera outbreak beginning of July. Their main ongoing activities are sanitation and hygiene promotion in Wau Shiluk. Their volume of activity is pretty low.

In general, their performance is acceptable with few improvements to make, and a bit of delay in progress to be filled.

In Wau Shiluk, they built ***communal latrine which should be avoided in residential place/village*** (ECHO WASH policy). They start with defecation trench and defecation area (providing digging tools). This is a trusted response but in this case the trenches collapsed. Their time of reaction was proper as SI.

They have a bit of delay in the achievement of the latrine, but they just rise up their capacity to speed up the work. As, SI they have a good time of reaction after the two emergency situations they faced. In both case, they were ***on ground starting activities 48h after the alert*** was launched.

MEDAIR have hygiene promoter on ground mainly using megaphone and organizing spontaneous gathering with small group of people initiating discussion using a flipchart made on tissue. They also do door by door sensitization. Their staff seems to be proficient in it.

3.1.4. Main issues discussed

The first latrine they did had problem in the design (mainly regarding privacy) but they have corrected it. However, as most of the partners that are not using UNICEF red slab with cap fixed on the edge of the slab defecation hole, their latrine had in most of the case ***no cap and no insect proof screen***. The monitoring of the latrine construction and quality of supplies has to be enhanced as we noticed a technician who was ready to set up a broken slab. Few latrines had to be decommissioned during our visit.

The ***way of latrine beneficiaries' selection should be more cleared and the strategy to rise up ownership enhanced*** (mainly based on the fact that the people should built the shelter but they don't dig the pit, so they contribution come after the one of MEDAIR and thus there is risk of failure).

In Wau Shiluk, we can see two type of soil. At about 2m, the ground seems to be richer in sand and thus could have a relevant seeping capacity. It has been request to MEDAIR ***to perform a seeping test*** to have an idea about the potentials. Whether the potential is relevant to ***avoid need of desludging*** or to ***increase the lifespan of the equipment,*** it has been advised to the partners to focus on this area for the latrine, as the two areas are close to each other's.

South Sudan has been regularly facing large rapid population displacements. In a matter of days thousands of people move to location without proper sanitation facilities. In the future for similar cases, Medair would like to be in the position to install prefabricated latrines. These can be installed very quickly, elevated or over a trench and at costs similar to digging latrines. Speed is the key here. MEDAIR WASH Advisor is particularly thinking of the Dunster type latrine (presentation ***dunster latrine in appendice***). He believes in a matter of days these latrines could be installed for 1000's of

people. It is highly appreciable that partners are trying to improve their strategy based on relevant analyze and learning from the problem they face. Although, this type of latrine seems to don't be very robust and sustainable, nevertheless in a first phase of an acute emergency it is relevant.

3.2. ACF US

3.2.1. Performance global estimation and activities outline

ACF US came to South Sudan recently ***to fill gap within the cholera response in Juba***. Thus, they got one of the trickiest areas as those areas are urban and not well defined to limit the action in space. They work mainly in Tongping quarter in residential area and in Coco camp (camp for IDP's Coco coming from the border with Uganda).

In general, the level of performance of ACF US is quite low. The ***main issues are their logic of intervention, the targeting and criteria of beneficiaries selection*** which are very confuse and irrelevant (apart for the latrine in Coco camp). The monitoring as well is pretty low. Furthermore, the WASH staff seems to be very confused and not proactive. They don't put in question what they do, even when it is a non-sense.

For instance***, they distribute PUR bags[9] to HH living around a hand pump that they have just rehabilitated*** (means flowing clear water). The water committee members meet during the visit did not even know what PUR bags were.

They have ***few technical breaches*** as well, like the stability of latrine slab in some case has to be improved, the non-chlorination of the drilling after removing the pump and open it.

The hygiene promotion component is very low in terms of materials used, proficiency of the operational staff, strategy. The level of knowledge regarding cholera of the water committee for instance was very poor. Thus, it seriously needs to be enhanced.

The training of water committee is very weak compares to the plan, as the water committee is not able to repair the pump in case of any breakdown. The training includes in terms of hand pump reparation only tiding of bolt and changes of joint pieces (not mastered by the water committee members). The "training" has last few hours. The only good part is to try to get the committee collecting some money from the users to have a capacity to afford potential future breakdown.

3.2.2. Main issues discussed

During the visit of Coco camp, we noticed that one of the beneficiaries of latrine had probably sold it. However***, the strategy of latrine beneficiary selection is pretty working in a way that the latrines visited were very clean and family improve themselves the original design***. Normally, they ask them to dig the pit and they provide the slab, wooden frame, and few construction materials. At the beginning of the visit they tried to mention that the criteria of selection were based on vulnerability but at the end we find out that the main criteria was the motivation of the beneficiaries, which constituted the best criteria to ensure sustainability. And then, few successful latrine owners will influence in time the majority of the community and will keep memory of the design.

[9] PUR bags are water purifier used for very turbid water

One the ***main targeting problem of ACF intervening in urban part of Juba is the level of desegregated epidemiological data regarding the provenance of the cholera cases*** in order to better target their intervention. One of the reasons could be the lack of linkage between health and WASH sectors.

Although***, ACF US has to set up a parallel system to collect accurate date to better size and target their response***, ***and rise up efficiency of the action and the investment.*** Accountability system has to be established as well, to ensure notably appropriate information regarding the project way of implementation, for the aimed population by the project.

One interesting things to note, is the fact that ***in Juba people used to buy aluminum sulfate from the market and PUR bags are sold in Pharmacy and Hospital*** (12 bags for 3SSP, means less than 1 USD). In coco camp, where we had a long discussion with a family, we noticed that most of the people used the PUR and store properly the water. The information they got about cholera and PUR was through the radio, then people with megaphone and then demonstration.

3.3. Intermon OXFAM

3.3.1. Performance global estimation and activities outline

Intermon Oxfam is the main WASH actor of Mingkaman. They are implementing a full WASH package in sector 2 with latrine block construction (elevated type; segregated with hand washing facilities), water supply system from boreholes, hygiene promotion and they are planning to start implementation of solid waste management strategy based at householder level (given the space available).

The ***global level of performance*** for Intermon Oxfam ***was pretty acceptable and even over it in some aspec***t. No relevant delay to signal.

Intermon Oxfam took over also the MSF CH's WASH activities including management of a SWAT system. There is some small improvement to in the management of the SWAT but generally it is pretty ok.
Thus, Intermon Oxfam operate 3 SWAT systems, 2 used for Water trucking and 1 used to supply a temporally water supply system of site 0. The total average production rate is over 1 million of liter per day, ***the average rate of water /cp/day is : 14,1 L.***
Intermon still have 36 latrines stances in the site 0***,*** in relatively bad conditions (rehabilitated several times).
Today, their main activities in terms of WASH in the site 2 where they built water supply system with connection to 4 boreholes and more than 100 taps. This system should enable phasing out of the water trucking for site 2 (in about 2 weeks). Today they face a problem of stability on the elevated (concrete ring in masonry with a frame of pool and beam in reinforced concrete, the structure is filled with mixed gravel).

They built and maintain about 400 latrine stances in elevated water proof structure (1 block of 4 stances has been closed up), and bathing unit. The structure were quite good (even if it require regular monitoring

especially after heavy rain to check the stability), ***most of the latrine were clean and hand washing facilities filled with water and soap furnished***. Furthermore, instead of paying people to do the cleaning of the latrine and to take care of the washing facilities like in Malakal, they pay community workers to mobilize and organize the community to do it (which is easier strategy to exit and generating less dependency). The issue is the design of latrine pit which aims a 6 to 8 months lifespan.

3.3.2. Main issues discussed

Intermon Oxfam is currently developing a strategy to work on sustainability and exit strategy. In the meantime, at field level they demonstrate a relevant and realistic analyze of the situation and are trying to think forward which is quite appreciable within this partnership context.

Focus on water supply and drainage:

The water supply system for the site 2 has been designed based on hydraulic calculation using EPANET software. Two drillings face problem as expected yield is not reach. The expected yield is 10m3/h, two drilling give this yield, one give about 8m3/h and the last one 5m3/h (maybe problem with the positioning of the screen), all for 6 hours of pumping without dropping of the water table. The pumping test has been done by RUWASA (NGO funded by UNICEFF to do drilling of borehole) which has been contracted by Intermon Oxfam. The pumping test seems to not be very proper as it should have been done during more time with time to recover static level between two pumping. Intermon Oxfam shares the same suspicious and will enhanced investigation. Bacteriological test should be performed as well, even apparently the drilling is 80mdeep (water level average about 60m) and the ground water storage should be a multi stairs sedimentary aquifer[10].Furthermore, Intermon Oxfam has CHF fund to build new borehole and equipped it with hand pump as back up capacity.

The elevated structure in concrete and mixed of gravel on which rely the water tanks should be reinforced. Oxfam Intermon notice sign of crackling on one and they are working on a solution (which should be a belt of reinforced concrete at mid-level laying down masonry plot). The problem comes mainly from an inappropriate compaction, although they have used vibrating tampers, they did it on a too thick layer (each 1m) when they should have done it maximum each 30cm and more likely each 15 cm (watery compaction based on proctor test could have been done as well).

The setup of the water treatment plant is quite good; even few improvements could be made. ***Mainly, review the management of chlorination at MSF CH SWAT as you cannot with this temperature keep a chlorine mother solution during 48hours before to use it. The way of***

[10] Multi stairs aquifer means that there consists on several layers of ground water separate by semi water proof materials, means good protection against surface pollution.

pumping from the sedimentation tank should be also improved to avoid risk of flock intrusion. Otherwise, most of backup equipment is present. The water treatment should have an operation and maintenance plan.
The main supplying pipe in site 0 is in HDPE and buried, but the connection line to the taps are outdoor flat pipe in most of the case. This situation should be improved since we have more visibility regarding movement of people (likely between the end of rainy and dry season).

The water point are well managed, FRC[11] correct, drainage acceptable, water point attendant is checking and promoting cleaning of jerricane. Intermon Oxfam made available stone and soap to do so at water point.

The problem of ***phasing out the water trucking*** for site 0 as well has been raised. This ***will need improvement and extension on the existing system***, but should economically relevant. The economical aspect should have to be carried out by the partners.

Focus on latrine:
For the latrine, the issue is always the same the presence of this black cotton soil which do not allows seeping capacity and then reduces lifespan of latrine or need desludging. Given the rate per latrine in site 2 about 17pp/latrine currently (target value was 40pp/stance), the lifespan could go over 6 months, it remains that in 6 months we have to deslduge or more likely decommission and built new one (taking over reusable part of the former structure). In about few months we might have a more clear picture about movement of the people, thus accordingly if people ***stay the latrine activity strategy*** could be to work ***at householder level based on subsidies approach*** rather than to keep communal latrine which nobody will neither rebuilt when it will be filled nor decommission***. It is much easier to raise ownership at householder level rather than at community level.***

Focus on Solid waste:
The new sites are clean. Intermon Oxfam plan also to implement a community lead solid waste management strategy given the space available. This strategy aims to dispose the solid waste in a burning pit to backfill and protect from rainfall with cover at the level of householder.

Focus on hygiene promotion:
In terms of hygiene promotion, the need of dynamic approach and adaptation of the tools and strategy to the context is a common need among the partners, and especially at UNICEF level.
The hygiene promotion deserves to be enhanced and more formalized. The knowledge of hygiene promoter regarding cholera was barely acceptable but for hepatitis E very low.

3.4. NRC

[11] FRC: Free Residual Chlorine

3.4.1. Performance global estimation

NRC is in charge of sanitation with elevated and water proof latrine construction of about 42 blocks of 8 stances (each with hand washing facilities), means a total of 336 stances in site 0 as well as care and maintenance (42 latrine care taker), and is one of the actors for hygiene promotion in site 0. They have 20 hygiene promoters and 40 garbage collectors.
The latrine care taker are paid 300SSP/month (means about 10SSP/day, compares to Malakal were they are paid 2,5 time this rate).

The volume of activity they have is quite low. The ***global level of performance is quite acceptable***.
Most of the latrine structures were ok and clean with some correction and improvement to make notably in monitoring of the functionality of latrine, secure privacy at all moment...
The dynamic of hygiene promotion and tools used need as all partners' improvement but at least in Mingkaman it seems that the partners succeed to create synergy among HP people as they organize a lot of common events.

3.4.2. Main issues discussed

Their ***solid waste management strategy is not clear*** and they were confused when trying to explain, apparently they will adopt the same strategy as Intermon Oxfam which is the one recommended by the cluster (and it is relevant).
Basically, they explain that they mobilize people to dig a hole and then to backfill it when it is full, but the pace are not marked and there is no solid waste stabilization by incineration or at least burning to also reduce the volume of waste.

Regarding the latrine, they will have at some point to harmonize their strategy of incentive payment for latrine care taker with others partners, although the level of payment is quite acceptable, especially compares to the usual rate found in South Sudan for community "volunteers".
The ***monitoring and systematic feedback from the latrine care taker must be ensured***, to don't have delay in correction of potential defaults noticed. Locked from inside especially for women must be secured.
The water proof features of their structures will have to be monitored and is secure in most of the blocks, but not all the ones visited during the visit.

NRC should also start to ***think about an exit strategy*** for the care and maintenance of the latrine but also regarding the construction of new latrine and decommissioning of the existing ones when it will be filled (as latrine are designed for not more than 8 months, and there is no desludging capacities). ***However, to do so, they will need to have better picture of the displacement of people. Normally, people from "their" site should for the most part, shift to the site 1, 2 or 3, and then the needs and the capacity to answer it, will be totally different.***

Their Emergency Director based in Nairobi is quite aware about South Sudan situation and features.

The level of the hygiene promoter in terms of knowledge of ***hepatitis E is pretty low*** and must be enhanced.
The flip chart used by NRC HP staff and produced by UNICEF strangely show latrine without cap and there is no siphon in most of the camp.
So, the IEC materials have to be adapted and dynamic strategy set in place.
Some of the hygiene promotion staff interviewed seems to be comfortable and "proficient" in their tasks, but others need improvement of their briefing/training and reminder should be developed.
Most of the ***hygiene promoters*** are trying to ***use occidental concept*** as they are trained with it, but they have ***to find the appropriate vocabulary or concept to address public health issues with understandable references*** for the communities targeted.

Some of the people interviewed told us about a specific roots or leaves (it was not very clear) which in their beliefs should cure hepatitis E (that they called the yellow eyes disease).

3.5. IRC

3.5.1. Performance global estimation and activities outline

IRC has the tricky role to be in charge of the WASH package for the site 3 which is the less populated and most remote site in Mingkaman. In addition, they are taking care of the water supply of the Ahou site (few kilometers upstream along the river from Mingkaman) where about 2500 IDP's are still living. They operate one small SWAT of 4m3/h production connected to bladders and 2*6 taps stand.
Their level of activity is quite low: Water supply for 2000 pp, plus WASH package for (today a bit more than 1000pp as about 100pp arrived since last update, although the site should host 9000 pp).

The global level of IRC performance is pretty low in all domains. They have ***some major delay*** but this is ***mainly due to the situation of scarce displacement*** from site 0 and the ***strategy to put in stand by*** implementation of ***new facilities***. Nevertheless, since the beginning of the project, IRC was already facing delays.

They built in site 3 about 152 latrines stance (currently: 1 latrine/ 7pp) and 20 bathing unit with a total of 40 doors (currently: 1 bath / 25pp). The latrines were in very bad shape for new latrine.
They contracted RUWASSA to build 3 boreholes (yield at 12m3/h, 68m deep, pump at 48m, ad hoc water table at 22m) for the supply of site 3 water network and planned to implement steel frame elevated structure (5m) for the water tank and pressure lines and taps ramp. 3

water points have been implemented on the site with a total of 14 taps. The trench of one of the pressure line is done (but the pipes haven't been laid down). Low level of hygiene promotion is going on in the site.

3.5.2. Main issues discussed

Regarding ***the latrines***, the ***original design hasn't been respected***: ***no vents pipe, no floor (sand bags no cleanable), no locked from inside, dirt inside, plastic sheeting ripped***… whereas they are, following the Intermon Oxfam strategy and pay community workers to mobilize and get the community organize to clean and monitor the latrine.

On site 3, IRC just equipped one borehole on three with submerged pump but apparently they did not made any calculation to check the feasibility of their system. They cannot technically justify the selection of this and that items or explain clearly what they intend to do with technical information. For instance it is not feasible to supply the taps stand (of 6 taps) with a pipe of 2" on the length they plan and with a flow reaching the standard at each tap.
Today, they partly supplied the existing 15m3 bladders by water trucking and sometime from the borehole (they are adjusting their pumping system).

During our visit of site 3, ***no FRC have been found at all water point*** and ***water temperature very high*** (pipe are outdoor). So, when the WASH PM was questioned about what kind of information we can get it from this parameter. He replies that is because the pipes are not buried. Actually, this shows especially that there is ***not enough demand and water is not moving*** in the pipe standing on the sun. After that we made a small test to demonstrate this to them, we went to the closest taps from the bladders and after few minutes to let the taps flow the temperature came down.

The ***recommendation*** was ***to have a schedule to open the water point to ensure sufficient consumption*** to empty the bladder ***in time*** and avoid rising up of the temperature in the pipe, and thus no FRC (chlorine).

The technician in charge of water quality monitoring was totally lost in his job and confused in trying to explain how is doing chlorination *or even how is using pool tester. He mixed up all the dosing rate according the volume of the bladder but also to method was wrong instead of to add more or less of mother chlorine solution at 1% according the chlorination rate fixed by jar test, he was changing the percentage of the mother solution. Then, when it comes to check FRC he mixed pH and chlorine reagent. Furthermore, some of the reagents of IRC were expired (no melting of the pills).*

The main responsible of this is the WASH PM as he is the one giving him instruction and this show a ***not acceptable lack of monitoring*** as well from the WASH PM. Although the WASH PM arrives 1 month before, that kind of problem should have been noticed very quickly since you go on the site.

The ***visit of the SWAT*** at Ahou site ***revealed also serious breach to technical rules***, ***with confusion again*** in trying to explain the functioning of the SWAT, for instance the frequency of the back wash for the quick sand filter. The sedimentation time and the concentration rate of aluminum sulfate totally inadequate. He shows us an onion tank used as sedimentation chambers, and told us that this is ready to be pumped to the system, but the flocks were barely noticeable and the turbidity of the surface has been measure at 50 NTU.

At the ***closest tap*** we found chlorine (injection by dosing pump), but also a turbidity of over ***20NTU*** after treatment composed by coagulation-flocculation-sedimentation and filtration with sand and active carbon prior to chlorination. The system work very improperly.

The water pumped is too turbid for the backwash frequency used, thus the filter get clogged and water find its way by creating fox path, means the water is not filtered anymore.

With such low level of activities, such non conformity, default and breach are NOT acceptable.

3.6. UNICEF, the Core pipeline and the WASH Cluster

Globally, the performances of all those bodies are pretty low and even sometime their agenda is very confused as well.

The UNICEF and WASH cluster are ***undermined by human resources problem and personal problem*** (mainly the UNICEF WASH Head of section and the National WASH Cluster Coordinator). Thus, ***WASH cluster and UNICEF seems to be totally different structure without any synergy*** between them. At time of need to be more cost efficient in the project, we particularly need synergy among the actor.

In general, the ***cluster focal points are young beginners*** not very comfortable and not getting a lot of support notably from UNICEF, but the ones meet seems to be quite dynamic and demonstrate willingness to play their role. ***The profile of those WASH cluster focal point seems to be most of the time not the most appropriate.*** Actually, to lead of coordinate a cluster and to develop relevant technical guidelines with the partners, you need to be proficient in your work, to get legitimacy and an added value.

Extract from field mission report from the WASH cluster at national level in Mingkaman; one among four main recommendations made by the national cluster coordinator: *“Explore w/ UNICEF the idea of*

providing Male and Female stencils for use by partners to mark latrines. As a standard supply item, this could be included w/ latrine slabs in the Core Pipeline"

The role of the cluster is pretty confused in South Sudan as the cluster is doing mainly coordination but do not play the role of technical support to the partners and ensuring the global quality of the response which is normally committed to play and thus there is a gap on this aspect.

This situation creates confusion, notably for the partners but also for the donors ***who is responsible between UNICEF and the cluster to provide to the WASH actors' technical support and ensuring the global quality of the response.*** Whether the cluster do not have the capacity and UNICEF as well to fill this position at least it should be clearly express and thus an alternative solution could be developed.

Apparently the coordination meetings are not very efficient, but it seems to be ***in progress of improvement***. ***In Juba, 5 meeting per week were held related to cholera response***: national task force; regional WASH task force; Social mobilization; Epidemiologic surveillance; WASH coordination.

Most of the cluster meetings attended was very long when coordination can be achieved by also others means. Details discussion occurred among a high number of attendees. Document have been presented to be discussed with partners during the meeting rather than to send document to be discussed prior to the meeting and then focus on the comments and highlighted issues.
TWG gathering a maximum of 6 partners are in progress to be established. Technical guidelines per activity should have been provided long time ago to the partners, as cholera is not new in the area.

The ***hygiene kit*** largely distributed during the first months of the response ***has been reviewed*** to be packed in a 45L container (tricky to transport) and the content has been reviewed as the first one had occidental comb and toilet paper (not use here).

Regarding ***the Core pipeline, numerous non-conformity and evidence of lack of efficiency*** have been reported by most of the partners especially when it comes to specific items (such as submerged pump …). Ruptures in the system, inadequate type of items selection, delivery delay are the main issues reported. The procedure to access the system and follow up supply chain is confused for more of the partners and especially to local NGO's. ***The system should be reviewed*** as apparently planned by UNICEF through a workshop with partners that should happen at the end of august. ***The machine is enormous and difficult to understand and assess properly in short time.***

4. CONCLUSION TO THE EVENT:

The level of achievement of the partners is very variable but apart few ones it is quite low in general, and especially low when it comes to water supply infra-structure. Nevertheless, there are several constraints to take into account when assessing the performance of the partners.

Main problems and challenges faced by the partners:

- *Structural problem:* Human resources. The living conditions and the situation of South Sudan are not very attractive or imply a heavy turnover. There is a lack of experience or/and proficiency at all level.
- *Technical problem:* the flatness of the land which do not allow relying on natural slop to supply or to drains water and by the presence of this black cotton soil which do not allow any seeping capacity of the ground and reduce drastically lifespan of latrine (or need endless desludging) and make very tricky drainage activity (risk of standing water and thus mosquito), increase risk of flood (**see strategic approach propose** in part 4.5)
- *The volume of the needs, the displacement of population and the geographical features of the country:* the logistic is a real challenge over there and can limit substantially the project implementation; the displacement of population at short term and intention of IDP's are very nebulous and make tricky to rely on any kind of prediction to plan a response operation or dimensioning of services to be provided for how long.
- *The tricky understanding of the context:* The cultural identity is pretty strong in this country and there is need to understand more accurately the base cultural of those populations in terms of resilience/coping strategy, the existing conflict resolution mechanism... *There is a real gap on this point* with serious consequences on the accuracy and the dimensioning of the response and thus on its cost efficiency.

The main problem face by the donors being the cost of the response which is very high due notably to the problem described here above. And also to the way partners works with community "volunteer" which constitute together with transport, desludging and water trucking a huge part of the budget in WASH project, and paradoxically generate dependency and thus vulnerability at mid-term.
One of the main issue to follow up substantially is the evolving of Hepatitis E case in Mingkaman, as an outbreak would be very difficult (and costly) to address in terms of WASH.

The situation do not seems to be able to change rapidly, instability and need of life saving will likely still remain at least at mid-term. Furthermore, those problems are enhanced by serious epidemic outbreak risks (hepatitis E, cholera …) and pressure on the food consequence of drought.
That's the reason why, the operational strategy of the partners should start to anticipate the need to base more the response on the communities. A strategy to progressively, by phase aim to make them as much as possible autonomous in a reasonable timeline and agenda, at least to answer their regular daily needs, should be developed as soon as possible. This type strategy should aim to have a soft hand over or exit strategy. Such process take time and require caution to don't make the system collapse, therefore it has to be start soon.
To develop such kind of strategy you need to rely and feed your thinking by relevant socio-cultural and economic information regarding the population targeted and their environment.

In consequence, I would like to propose, as a reference donor, the production of a reference document. The idea is also to contribute to a better understanding of the displacement of people and identification of underlie community influencer.

Therefore, I propose to fund ***a socio-anthropological*** (taking into account economic aspect) ***study*** but with accurate and predefine expected ***practical output*** to contribute:

- *to improve the level of analyze and understanding of the situation and the population of ours partners;*

- ❖ *to promote community resilience and accountability*.

The topics of the study should be (must be made by a socio anthropologist already familiar with the context):

- ✓ Repartition of power within rural Dinka and Nuer communities: who and how the rules are made and respected…
- ✓ Existing or/and past conflict resolution mechanism: review and dynamic
- ✓ Identification of coping mechanism with displacement and drought, and the traditional route of migration/transhumance
- ✓ Analyze and practical recommendation about the capacity of nuisance on the coping/resilience mechanism of the population targeted by the relief: capacity of the way humanitarian services are provide to generate dependency and vulnerability, with which timeline

In addition, the partners have been requested to fill a matrix to give an accurate overview of the volume of incentive payment in the current response.

5. MAIN RECOMMENDATIONS

5.1. Coordination and synergy

- o The coordination could be done by share document at some point to reduce time of meeting
- o All partners should be aware that they are all responsible of the global humanitarian response and thus they should inform each other's when they noticed problem or non-conformity even in a sector they are not involved to.
- o The cluster should promote technical support (especially if the cluster is not able to provide it) among the partners the different skill, specialty and experience put around the table as WASH is a wide field in which people cannot be specialist of all the aspect
- o The global proficiency level of cluster focal point and WASH specialist has to be improved

5.2. Monitoring and source of information/verification

- o All partners dealing with water supply system should have made minimum of preliminary studies and have available all the technical documentation used to design the system and select the equipment to be implemented
- o All partners involved in cholera response should collect the most accurate epidemiological data week by week and day by day during outbreak. At the most accurate level of administrative division (according the availability of data), the level of dehydration of sick people when they arrived at the health structure, number of death and the most accurate available data in terms of provenance of the cases and water source used should be collected to assess impact of action.

5.3. Community volunteer and incentive payment

- o All donors, stakeholder and partners should be agreed in case of an emergency response (due to movement of population or epidemic outbreak) implementation in a new area that no incentive payment will be made to community workers taking care of regular daily tasks.

The list of people volunteer (means no payment) to complete the daily task necessary to maintain properly water and sanitation equipment and solid waste disposal should be produced. Those people should benefit after wards from incentive payment when it comes to undertake irregular activities (like cleaning of the drainage channel …).
Whether no other solution, payment in-kind could be made, or payments of people to get the community organized to do the tasks and not to do directly.

The current definition of incentive payment per area and sector of activity showed too much difference and must be harmonized as soon as possible. Partners should adjust their grid of payment to the partners having the lowest grid in an area. Furthermore, and to better understand the issue highlighted, the amount of incentive payment usually commit are above the average salary of a teacher.

- Soft strategy to decrease the budget volume for incentive payment especially for daily community workers should be developed as soon as possible by each actor or at a global level and implemented progressively as this process take time to don't be rude with the population and reduce risk of collapsing at time of exit strategy.

- Many actors in all the site hire pp from the camp for different purpose (wash, protection, …), this capacity could be pooled when applicable in order to decrease the volume of incentive payment.

5.4. Water quality monitoring and water supply system

- In case of implementation of water supply system (out of emergency; emergency cannot be considered after 3 months apart specific cases) all the partners must prior to implementation make a preliminary design/studies with the initial assumptions used in the design with expected performance of the system, necessary hydraulic calculation and mathematic tools used, detailed lay out (length of pipe, diameter, PN/DN, materials, connection, features of all main equipment such as pump, hydraulic hammer protection, storage tank, treatment plant…), and all technical information necessary to ensure appropriate water supply according international standard

- When a measure of FRC is performed, the information of when the water has been delivered or fletched to the water point and chlorinate have to be recorded as well as in case of HH level monitoring the observation of the cleanness and the presence (or not) of cap on the jerricane in which the water tested were stored. Those information will enable analyze of the Free Residual Chlorine records to improve chlorination system efficiency.
- All partners operating water treatment plant should have an operation and maintenance plan available
- Water consumption when water supply activity must be monitored and records on daily bases at global level and ad hoc per water point.
- No distribution of PUR should happen prior to demonstration, and PUR are distributed only in case of water source turbid

5.5. Sanitation

- Drainage of the camp has to be regularly monitored to avoid major spot of standing water.
- In case of desludging of latrine pit: Access road to latrine pit should be improved, to avoid lack of desludging and overflowing of certain latrine pit into the camp

- Most of the latrine visited were clean and used but without cap and mosquito protection on the vents pipe, as well as locked from inside. Action should be led to correct this situation and ensure cap (or siphon) on the slab and mosquito protection on vents pipe, and possibility to locked from inside. *In case of siphon' used and not flush, so small quanity of water poored, partners must select with caution the appropriate type of siphon to ensure disposal of the exreta into the pit and no clogging.*
- Problem of misused of latrine and bathing facilities should be addressed through hygiene promotion and community staff in charge of the latrine and bathing block
- Some latrine block in the camp had opening to the pit which should be backfilled to avoid water and vermin intrusion.
- Desludging disposal: The disposal of garbage and sludge is done in an open area few hundred meters from the camp. The desludging disposal site (small ponds) should be improved and a process based on phyto epuration should be implement to reduce as much as possible the biologic load disposed in the pond
- Solid waste disposal: At least a system to incinerate the solid waste should be implemented to reduced volume and stabilized the waste
- Normally the WASH policy of ECHO is reluctant to build communal latrine unless is for a camp, health center, school or others public area.
- Stability of the various latrine block will have to be follow up after heavy rain
- Try to identify and mark further latrine location if existing one will have to be relocated when full
- The privacy in both bathing unit and latrine block has to secured at all time
- Strategic note: In such protracted crisis *the latrine activity strategy* given the technical challenge faced (no seeping capacity), should after the acute emergency phase and the current consolidation phase of the response, focus to work *at householder level based on subsidies approach* rather than to keep communal latrine which nobody will neither rebuilt when it will be filled nor decommission*. It is much easier to raise ownership at householder level rather than at community level.*

5.6. Hygiene promotion

- All partners must improve the level of skill of their staff. Hygiene promoter should not be confused when diffusing the key messages
- All partners must adapt to the context and harmonized tools and strategy
- In case of an epidemic outbreak emergency (movement of population, epidemic outbreak,…) response (or even at some point in case of displacement of population), the mode of communication for hygiene promotion should be an information mode focusing on warning people, main key messages to deal or/and identify the disease and rules of protection.
- A serious caution must be made by all partners when they intend to gather people for any activity in case of epidemic outbreak with high interpersonal risk of contamination

5.7. Miscellaneous

- In South Sudan water supply system should be designed based on accurate topographic survey, as well as identification of prone flood area. The relevancy of topographic survey is even more crucial that the country land is usually pretty flat and thus small variation of altitude is even more important to take into account.

Appendices 1: DETAILED TECHNICAL RECOMMENDATION BY PARTNERS AND SUB SECTOR

IOM in Malakal

Water Supply:

Regarding the "semi-permanent" Water Supply of POC and new camp sector for relocation of people (the comments are based on the fact that at time of the visit we have passed the emergency and the setup of this new system cannot be considered as an emergency one, although logistic constraint has to be taken into account given the specificity of South Sudan on this aspect):

IOM have to provide urgently a technical report about the solution proposed to treat the non-conformity noticed during the visit and especially about the serious correction to undertake on the pump station and the main supplying pipeline, in terms of items selection and set up. IOM has to propose technical solution to put in conformity its system, with the performance assumptions to reach and the different mode of regulation of the system. The report will have to include all technical documentation to ensure: appropriate correction and selection of items, update of the design and assumption, appropriate timeline of the improvement and correction to make. *This report should be merged with the technical report mentioned down there (1st bullet point of the next part about water intake and pump design…).*

- Water intake and pump station design, equipment and management:
  - ***Produce urgently technical report*** (including the technical sheet of the pump with characteristic curves and technical sheet of the pipe) regarding the ***design*** and implementation of the pump station and pressure pipeline providing clearly the initial assumption of the design, the calculation/estimation made (hydraulic loses, if applicable hydraulic impact of the connection of the pressure pipeline between pump station and treatment plant, working point of the pump with related energy efficiency, estimation of hydraulic hammer risk and proposed solution, …), tolerance accept in the design, main constraint take into account to design the system and what have been really implemented and how. *NB: the working point of the pump must be shown on a graph showing the characteristic curves of the pump, the network curves (means evolution of HMT according the flow), and the operating/working point of the pump being the crossing of the two curves.*
  - ***Take urgent action to correct the non-conformity noticed on the main pressure pipeline (****FYI DN DN90 HDPE exists packed in rolled drum****) ; PN) and pumps (performance and cost efficiency) installed at the river intake***
  - ***Develop proper detailed*** (mentioning the main features of the equipment implemented, as for instance for the pipe: length, internal diameter, and PN/NP, type of PE, and eventually S/SRD European norms to estimate the resistance of the pipe,…; regulation and protection equipment; features of the pump; trace of the pipe and interconnection if there is,…) and accurate ***lay out of*** what has really been implemented and how (example: connection or not of the two pressure pipeline between pump station and treatment plant,…)

- ***Replacement of improper equipment*** implemented such as ¾ round gate valve connected to the pump by regulation valve (if possible 10 round minimum) to decrease potential impact of hydraulic hammer
- It is also very important to ensure that the pump do not constitute an anchorage of the pipeline
- ***Implementation of pressure meter*** at the outlet of the pump (to follow the pressure stabilization when start up and enable to operate properly the pump) ***and water meter*** at the outlet or at the inlet of the pressure pipe at the treatment plant location
- ***Implementation of a by-pass of the pump*** at the intake to protect the pipeline against depressor
- ***Implementation a check list or procedure to operate the pump***, especially to start up (upstream valve closed, …) and shut down the system to avoid major damage on the pressure pipeline and quick deterioration of the pump and/or loss of efficiency of the features of the pump (flow and pressure, energy consumption) and trained the local WASH Manager to operate properly the system in accordance
- ***Ensure appropriate back up system*** (pump, generator…) to minimize risk of interruption of the water supply
- The ***pump station*** to avoid moving of it when the river level change, should be ***set up in appropriate floating structure*** (like barge made with drums and steel frame and wood for instance)

- <u>Main supplying line, pressure pipeline of raw water from the river intake:</u>

The pipe PN/NP and even diameter (according economical analyze) of the main pressure line between the river intake and the treatment plant will have to be replaced (for question of sustainability and cost efficiency) at some point according the result of the ongoing investigation by IOM on site and new assumptions that will be proposed.

- <u>Water treatment plant design and management:</u>

  - The treatment plant need an operation and maintenance plan with: the different assumption and data take into account to design the system, time of sedimentation, time and/or indicator to start pumping in one tank, when, how and with what the jar test has to be performed to adjust the treatment rate, etc…
  - The quality of the treatment has to be controlled in much appropriate and relevant manner (today they control the turbidity of the water by checking the surface water of the sedimentation tank whereas the outlet is located down on the tank…)
  - At least, a tap should be installed at the outlet of the tank to enable appropriate sampling and checkup of the water quality pumped to the system
  - Corrective measure must be taken to avoid pumping into the sedimentation tank and then risk of flock (concentrate in aluminum sulfate which are not recommended in case of malnutrition) into the distribution system, especially using outlet pipe located down the tank and having chlorination dosing pump just after (so risk of chlorine consumed by flock)
  - The treatment process and equipment has to be basic and robust, no risk to be taken in it. The problem to ensure more efficiently sustainable water quality in terms of treatment process should be reached rather than to implement a membrane filtration system, by a better hydraulic set up of the system (potentially added of storage and hydraulic equipment),

better adjustment of the coagulant treatment rate) and eventually quick or slow sand filter, or polymer cartridge filter to ensure a fine set up and final catching of potential flock before pumping which should be the main objective to reach. No need of a fancy system reaching European standard for short time and then collapsed, leaving people to their former raw water resources, with loss of their immunity.

- Water storage tank, distribution network and taps stand:

  - Due to the lack of natural slop, the distribution network is a pressure network using 2 Grundfos pump with hydraulic vessel in parallel, setup in appropriate manner, however regulation valve (minimum 10 round to close if available) should be installed on the network to reduce risk of hydraulic hammer pretty high for a pressure network and despite the hydraulic vessel protection at the distribution pumps location. Elevated water tank structure are planned to be installed to enable distribution in gravity and thus much sustainability in the system as well as less running cost.
  - The pump station after the storage tank and before the distribution network should have at least one spare pump
  - Due to the way of water treatment plant functioning, the supply of the water point by the distribution network is scheduled between 12 noon to 2pm and between 4pm to 6pm. This type of schedule does not reflect the habits of the people which usually fletch water early morning and late afternoon. Furthermore, the waiting time at the water point is pretty long with long lane of jerricane. The schedule of water distribution at water point should be extended to decrease waiting time and reflect habits of people.

- Water quality monitoring:
  - The FRC (Free Residual Chlorine) record made at HH level showed during the visit seems to be unrealistic as all the result are mentioning the same value (0,1mg/L), which is pretty unlikely. Thus, the supervision of water quality monitoring should be quite enhanced.

- Overall operation and maintenance of the Water Supply System:
  - Technical note about the whole water supply system design, with all technical features and performances details of the system has to be provided. The technical note should include design assumptions aimed, technical solutions selected to reach design assumptions based on calculation, and all relevant documentation to give an accurate and reliable outline of the water supply system in terms of performance and technical features/outline.
  - An action plan about correction of non-conformity noticed (focus on pump station, pressure pipeline, water treatment plant, and operating of the system) and of difference between equipment planned to be installed and equipment installed
  - Mapping of the main element of the water supply system should be done
  - The technician in charge to operate and maintain the system must have an accurate knowledge of the different element of the system and of its performances

Note: It is important to take into account when assessing the performance of IOM, the tricky logistic situation, as well as the different changes operate on the site planning in terms of number of population planned to be host. However, it remains very low at the level of the water supply system.

SOLIDARITES INTERNATIONAL / SI in MALAKAL (POC/camp) /Wau Shiluk (RRM)

Full WASH package and RRM

Sanitation:

- The drainage of the camp has to be regularly monitored to avoid major spot of standing water.
- Access road to latrine pit should be improved, to avoid lack of desludging and overflowing of certain latrine pit into the camp
- Most of the latrine visited were clean and used but without cap and mosquito protection on the vents pipe, as well as locked from inside. Action should be led to correct this situation and ensure cap on the slab and mosquito protection on vents pipe, and possibility to locked from inside. The problem of misused of latrine and bathing facilities should be addressed through hygiene promotion and community staff in charge of the latrine and bathing block
- Some latrine block in the camp had opening to the pit which should be backfilled to avoid water and vermin intrusion.
- Desludging disposal: The disposal of garbage and sludge is done in an open area few hundred meters from the camp. The desludging disposal site (small ponds) should be improved and a process based on phyto epuration should be implement to reduce as much as possible the biologic load disposed in the pond
- Solid waste disposal: At least a system to incinerate the solid waste should be implemented to reduced volume and stabilized the waste

Hygiene promotion:

- One of the main concerns is related to the adaptation of IEC materials that are used, notably posters on which we can see a lot of text in English. The posters should mainly be made of drawing reflecting the local environment. These materials should be tested with a sample of population as well as the way message are express to ensure that understanding of targeted population. Some of the flipchart used made by UNICEF show latrine without cap whereas the point to have a latrine is to put a barrier on the route of contamination.
- Posters should be put at all water point and latrine block as well as main public place
- The HP should be implemented in a dynamic manner to avoid loss of interest from the population

Disinfection of HH premises:

- Training of staff should be enhanced and a check list of task to do plasticized should be deliver to each staff to have a reminder

Focus on Wau Shiluk Emergency cholera response with:

- *water supply system setting up and operating:*
  - Some water point has to be improved in terms of access, and at the standing point (duckboard)
  - the procedure to pump from the sedimentation tank to the bladder just before the taps stand as to be enhanced (limit of pumping in terms of water level in the tank) to avoid pumping of flock in the system which could jeopardized the water quality.

- For conservation issue, storing of chlorine has to be improved by using zip bags for instance which enable to release air

- *Sanitation: communal latrine*
  - Normally the WASH policy of ECHO is reluctant to build communal latrine unless is for a camp, health center, school or others public area.
  - The latrine pits are as well for most of them in cotton black soil so with no seeping capacity. During the visit observation showed that apparently on some location at 2m seems to be more rich in sand and could have a seeping capacity although it will more likely be low, seeping test should be performed to estimate roughly the seeping capacity (test should be performed with turbide water to be more close to the real condition of pit when in use). According the seeping capacity estimated by the test those location should be preferred, to decrease need of desludging and increasing live lasting of the pit.

- Disinfection of HH premises:
  - Same comments as above

- Definition of incentive payment:
  - The incentive payment by task should be harmonized. SI apparently pay 25 SSP/day in MalakaL but 45 SSP/day in Wau Shiluk

MEDAIR (sanitation and hygiene; RRM):

- *Cholera emergency response with Sanitation (latrine) and Hygiene promotion in Wau Shiluk*
  - Same comments and recommendation as for SI (Malakal/Wau Shiluk)
  - Some defecation trench or pit latrine has to be decommissioned
  - Tracking system of cholera sick people has to be established to enable systematic hygiene promotion session in the affected environment
  - Avoid communal latrine especially in village and out of camp, health structure and school
  - Payment of digging latrine pit should be avoided
  - Should improve their mode of selection for the latrine
  - Enhanced monitoring of supplies and latrine construction, as well as need of decomissioning

UNICEF / Malakal WASH Cluster:

- It is obvious, given all the complaint and example of failure or shortage, that the core pipeline system should be reviewed, the visit in South Sudan did not gave enough to assess properly the problem and gap of the pipeline which is very complex and confuse system.
- For the warehouse management: The definition of warning threshold to re order an items hasn't been defined. Apparently, high leaks of items from the warehouse have been noticed by the partners. SI took over the management of the warehouse since 4st of august.

- Technical level of the UNICEF WASH staff seems to be very low when it comes to water supply system
- Hygiene kit used to include occidental hair comb and hygienic paper (not used in the context). The hygiene have been adapted but kit are packed in 45L drums taking a lot of volume for the transport (1 container 20ft = 600 kits)
- The Cluster there is doing only coordination of the partners through regular short meeting, but no technical support to ensure quality of the global response as well as from UNICEF

SOLIDARITES INTERNATIONAL in JUBA (working in POC 1 and 2 of UN House):

Full WASH package, RRM at national level

Water supply system:

- Done by water trucking. The partners should start to think about potential exit strategy, alternative to very costly water trucking .
- Bladders should be progressively replaced by PE tank more sustainable at mid term
- In POC 2 SI has taken over a water supply system built by Oxfam which should be supplied by a borehole:
  - The borehole yield being insufficient to supply the system, therefore hand pump will be installed instead of the electric submerged pump, means the storage tank facilities will still have to be fully supplied by water trucking. Investigation should be made by SI to assess alternative solution which could be a new drilling if feasible to phase out the water trucking.
  - The water distribution network laid down by Oxfam is a mix of different pipe materials (HDPE, flexible plastic pipe used for bladder and hose pipe which should not be buried. Many leaks have been observed during the visit on flexible plastic pipe no buried and laid down a drainage trench with waste water. The leaks should be fixed and if possible pipe in plastic and hose pipe replace by HDPE and pipe properly buried. Problem is no budget was plan by SI to complete those tasks (apart leaks reparation) as the system was built by Oxfam.

Sanitation:

- Organization of the people in charge of maintenance has to be adjusted. For instance for the latrine we have one persons in charge to oversee and to fill hand washing facilities with water, and one to clean it. The staff should be progressively reduced.
- The drainage of most of the bathing unit has to be improved
- The privacy of users of latrine and bathing unit and especially the women has to be ensured (reparation of plastic sheeting torn or ripped up, …)
- Latrine pit should be lined to enable full desludging, could be done with galvanized wire net and plastic sheeting
- Cap on the latrine slab must be systematic
- One of the main issue for the design of those communal latrine (low capacity of the pit) is that the ground water in the area consists of fracture which can be shallow and then we cannot take any risk to dig a pit which could contaminate very quickly the ground water resources

used to supply all the UNMISS premises. Although, dimension of further pit could maybe be increased by increase the surface of the pit. The partners should start to think about how to improve sustainability of the system and decrease need of desludging.

ACF US (short emergency cholera response project in urban area):

Water supply and access:

- The partners has to quickly developed a logic and criteria of intervention per activity to avoid wasting action (and then money) like distribution of PUR bags around a hand pump which has been rehabilitated (with clear water), and to understand the selection of hand pump rehabilitated.
- The mode of PUR distribution has to be improved, member of the water committee should be integrated in demonstration and relay the information to the community (the ones interviewed did not know how to use it). Appropriate, tested and adapted IEC materials could be developed and left in the targeted area to keep memory of the message.
- The training of water committee has to be or reviewed and enhanced with reachable objectives or canceled. The part about the collection of money to support potential breakdown should be kept.
- Any removing of hand pump and rehabilitation of borehole must be followed by chlorination of the borehole before to open the access to the users (of course chlorination has to be removed by pumping prior to let people use it).

Hygiene promotion:

- Posters keeping memory of the main messages (cholera and/or hygiene) have to be implemented at all water point and latrine locations, or water committee office in the intervention area. The posters should be in vinyl or laminated to ensure sustainability.
- The posters could be changes according the topics of the week or month. At least each water point should be equipped with an information board.
- IEC materials have to be adapted to the context
- Hygiene promotion (or awareness) should focus on cholera dedicated messages in emergency and the method of communication should be based on informing people (could be performed in a participatory manner using questioning) and not on a real participatory method aiming to changes the behavior (not applicable in short duration emergency project).
- IEC materials should be developed in accordance with the comments made above.
- Training of hygiene promoter should be enhanced to make them more comfortable to use the message and existing IEC materials
- Within the hygiene promotion message and alternative must be given to the people when it comes to use of latrine as can be reluctant for people who do not have it, thus advice to buried at least the feces should be given when in resident communities (like SI in Wau Shiluk)
- Information regarding the intervention in resident communities should be delivered to the people to understand in case of cholera response emergency project that all the services provided at time of cholera will be phased out when the outbreak will has been tackled (accountability).

- In case of PUR distribution, ACF should promote people from the community who know to use it or are comfortable to demonstrate to the others to promote building of the local capacity (resilience). In general and especially in hygiene promotion it is important to promote input from the people targeted by the project. Demonstration should be implemented in the same spot several times and not only once.

Sanitation (latrine):

- The selection criteria of the beneficiaries of the latrine kit are not clear, but strategy at HH level in camp located in urban area, based on community led and motivation of the HH is pretty relevant, and most of the latrines built few weeks ago showed ownership evidence (improvement of the design by the beneficiaries)
- The frame supporting the slab has to be reviewed to ensure reliability of the structure, as some latrine as showed slight problem of stability.

UNICEF / WASH Cluster in Juba and at national level:

- Meeting should be straighter forward and less time consumer to facilitate the work of the partners, especially in time of emergency.
- Accurate and disaggregated epidemiological data should be provided to the partners to ensure proper targeting and efficiencies of the action and the investment.
- Proficiency of the cluster lead in the most tricky area should be improved in terms of coordination and technical skill
- If the cluster has a lack of human resources to ensure technical support to the partners, they should then more promote the skill available among the partners.
- It has been requested from UNICEF during the mission to propose more disaggregated data regarding their activity to understand accurately what has been done by UNICEF and what has been done by the partners.

Intermon OXFAM:

Full WASH package

Water Supply:

- *Water quality monitoring:*
  - When a measure of FRC is performed, the information of when the water has been delivered or fletched to the water point and chlorinate have to be recorded as well as in case of HH level monitoring the observation of the cleanness and the presence (or not) of cap on the jerricane in which the water tested were stored. Those information will enable analyze of the Free Residual Chlorine records to improve chlorination system efficiency.
  - Bacteriological test should be performed on the drilling/boreholes completed by Rwassa (Local NGO fund by UNICEF), even drilling depth is at 80m and the ground water catch should a multi stairs sediment aquifer

- All the bladders should be systematically protected from the sun.

Regarding the new water supply system of Site 3 built by Oxfam:

- 2 boreholes needs additional proper pumping test
- Implementation of PVC pipe should be done carefully with special caution on the way to lay glue on the pipe edge when doing the connection. PVC should be lay down and backfill should free of stone (the capacity of certain scaly soil to swollen and then increase external compression force on the pipe should be considered).
- Purge should be implemented on the main distribution lines of the network (to enable releasing of air when startup of the system and cleaning of pipe in case of reparation)
- Implement hygiene promotion posters at all water supply equipment. Water point should be equipped with information board. The topics could with focus on water uses, and the safe chain of water supply (cleaning of jerricane, way of fletching in containers,…).
- Poster (in vinyl or laminated to ensure sustainability) with topics focusing on hand washing, use and cleaning of latrine and environment should be systemically implemented at latrine block (some already have awareness materials but small size and general.
- Solution will have to be found to supply in water school and health center which have been built after setup of the water supply system, without informing Oxfam about the future location at time of implementation of the system.
- Need to ensure resistance of the concrete structure built to support and rise up the level of the storage tank to enable gravity supply of the distribution network (Oxfam work on it for the time being)
- Relocation of temporally water point that are not really uses
- Water consumption have to be monitored on daily bases

Regarding the emergency water supply system:

- *Water treatment plant:*
  - Water meter have to be implemented at the outlet pipeline
  - The process in the next months (after 6 to 9 months of using the system) should be fined tune to ensure no risk of flock in the water distribution network and truck, by implementing a storage capacity of treated water (supplied by gravity after the sedimentation tank or with a system to trap the flock before the treated water storage tank) before pumping to the network or to the water truck, or sand filter, or other appropriate solution

  - Tap at the outlet of water from sedimentation tank should be installed in MSF SWAT to enable water sampling to check water quality (turbidity, …)
  - An operation and maintenance plan with check list of task to do by frequency of performing has to be developed for each SWAT

- *Water distribution network:*

- If the system is still planned to be used for a year, the flat pipe and non-buried pipe will have to be replaced in HDPE pipe and buried

Sanitation:

- Stability of the various latrine block will have to be follow up after heavy rain
- Try to identify and mark further latrine location if existing one will have to be relocated when full as the latrine implemented are not desludgable and design for 6 months.

Hygiene Promotion:

- The methodology apparently is based on repetition, but it should a bit dynamic to avoid loss of interest from the public aimed and promote volunteer input from the communities. The materials of awareness should be more adapted to the context through test with a sample of population concerned.
- The training of the staff in charge of Hygiene promotion should be enhanced and focus on practical exercise like role play, simulation. Input from the staff to have a dynamic and evolving hygiene promotion approach should be promoted to developed new way of communication to address issue, and to base more the way to express the message and the concept used to promote it, on the referential of the targeted communities.
- The hygiene promoter have to get substantial training or briefing regarding hepatitis E and cholera (see if there is others specific disease which should be addressed) with distribution to them of check list or reminder about: the symptoms, what to do in case and protection rules
- An hygiene promotion action plan with tools and methodology to use according the context, reminder and tips has to be developed
- Implement hygiene promotion posters at all water supply equipment. Water point should be equipped with information board. The topics could with focus on water uses, and the safe chain of water supply (cleaning of jerricane, way of fletching in containers,…).
- Poster (in vinyl or laminated to ensure sustainability) with topics focusing on hand washing, use and cleaning of latrine and environment should be systemically implemented at latrine block (some already have awareness materials but small size and general.

NRC (sanitation and hygiene promotion):

- Monitoring of the latrine block has to be enhanced. Latrine care taker have to informed their supervisor when there is problem on block
- Intimacy has to be ensured in all the block
- NRC will have to follow asap the same strategy of incentive payment for the latrine care taker, garbage collector and so on as the other actor (means stop paying people to do the work, but in the 1st phase, pay people to push people to work like cleaning of their latrine) and decrease as much as possible the amount of incentive payment in coordination with others partners
- Water proofing of the latrine pit has to be monitored especially at time of rainy season
- Stability of the various latrine block will have to be follow up after heavy rain
- Try to identify and mark further latrine location if existing one will have to be relocated when full

- Poster (in vinyl or laminated to ensure sustainability) with topics focusing on hand washing, use and cleaning of latrine and environment should be systemically implemented at latrine block (some already have awareness materials but small size and general.
- Regarding hygiene promotion, same comments and recommendation as for Oxfam up there

IRC

Full WASH package

In general:

- The monitoring and supervision have to be drastically improved on site, as well as the training of the operational staff
- IRC has to demonstrate that they have the skill to achieve what is planned
- A strategic note about the different assumptions of movement of population to or from their site (site 3 in the new sector) and the action planned to be led by IRC according the different assumption has to be produced
- Ensure appropriate storing of reagent and chlorine, and ensure that all reagent used are not expired

Water supply:

- After notice of many non-conformity regarding the design of the site 3 water supply system (drilling with submerged pump to supply storage tank and then distribution pipeline connected to taps stand; or drilling equipped with hand pump according the water demands of the site).
- Production of a technical note ('design") with: all the data collected, technical sheet for the pipe and the pump, assumptions and hydraulic calculation made to design the system, the technical features of the equipment plan to be installed; detailed lay out, log profile of the drilling, result of water test and pump testing; all information to ensure that the system will be properly implemented, technically conform (features of the pumps, different pipe and fittings PN/NP and diameter, working point of the pump, and that the performance (flow, pressure, quality of the water) of the system will match the needs take into account
- A water quality monitoring plan with: type and number of test to be performed at which moment, with which equipment and reagent, by whom, the information to be collected, the way to sample …
- An operation and maintenance plan has to be established for the SWAT used at Ahou (indicator of clogging of the filter has to be followed to backwash in time the filter and avoid clogging which means fox path in the sand for the water which will not be filtered properly; sedimentation and coagulation process have to be improved as well as way to pump in the sedimentation tank to avoid as much as possible flock going and then clogging the sand filter; …)
- For the SWAT, jar test has to be performed to adjust more efficiently the treatment rate used for aluminum sulfate as well as contact and sedimentation time

- Quick sand filter used at the SWAT has to be fully clean (means sand to be removed and washed) and backwash as to be programmed efficiently to avoid clogging of the filter and creation of fox path[12]
- The WASH manager on site has to be permanently on the field with his staff until they know perfectly their tasks. Technician has to be briefed and substantially trained to perform chlorination, monitor water quality and to operate and follow up the SWAT system
- The WASH Manager on ground has to get intensive support from his WASH coordinator on site
- Bacteriological test have to be performed for the different borehole
- An action plan to correct all nonconformity observed during the field visit has to be produced as soon as possible

Sanitation:

- Staff in charge of latrine cleaning and filling of hand washing facilities mobilization have to be briefed to ensure that all defect or problem with latrine and bathing unit are raised to their supervisor
- Hand washing facilities have to contains water and soap at any time
- Backfill with compacted clay materials have to be done on the latrine block to ensure waterproof of the pit and drained running down rain water around the structure
- Stability of the various latrine block will have to be follow up after heavy rain
- Try to identify and mark further latrine location if existing one will have to be relocated when full
- The latrine blocks have to be drastically improved and put in conformity with the design
    1. Floor of the latrine have to be implemented (to enable cleaning)
    2. Vents pipe have to be installed with insect protection
    3. Latrine have to be cleaned, plastic sheeting wall have to be repaired when needed to ensure privacy
    4. Handle system have to installed to enable opening of the latrine doors, and to enable closing from inside

Hygiene promotion:

- Same comments as for Oxfam and NRC but with more need of improvement

WASH Cluster in Mingkaman

The WASH cluster from Mingkaman suffer a lot from turn over in the leading position, 5 persons have held the position in about 6 months. The current WASH cluster coordinator for Mingkaman arrived one month ago seems to be motivated and dynamic, but it is her first experience as cluster lead.

She is trying to get everybody on the same page, trying to organize common response (notably for hepatitis E) and trying to provide support to anyone. She is pretty confused about the role of the cluster in terms of technical support and ensuring a minimum of quality level for the global response.

[12] Fox path is when the water is filtered through a sand bed and this sand bed is clogged then the water is digging small hole to find its way and thus the water is not filtered anymore

The cluster seems to be more effective, and improving, even too long discussion occurs among to many people instead of in small group. The cluster has to be participative but in the meantime it need framework otherwise the discussion can be endless. Some part of the coordination role of the cluster could be play by sending document for review prior to the meeting to have a more straight forward discussion during the meeting.

Appendices 2: Technical detailed on IOM improper pump and pipe selection at the river intake

Rough estimation of the needs: The water needs are for the displaced population 17000*15L = 255 m3/day, plus the needs for the HUB, the hospital and the cleaning of sedimentation tank, roughly about 40m3/day, plus an average network efficiency of 90% (means 15% because it is a small and not design for long term network), means about 30m3 needed in addition; Total minimum demand to be considered with current population: 325m3/day.

The pumps (see technical note about the pump in appendice) installed at the river intake should have been by order DMS 12/5 type working at 7,5 kW but those could not work at more flow than 12m3/h with the pipe laid down to supply the treatment plant, but during the visit the pump type written on the pump was not the same. The pump installed was the DMS 25/5 much more powerful working at 22kW which means to need of almost 100kVA to start up the pump and two have been installed so almost 200kVA to start it in the meantime (when the generator used is an UNMISS one of 500kVA but presenting a lot of breakdown, and the backup generator is only 150kVA). Those pumps should work in permanent regime at a bit more than 10bars (pressure limit for the pipe) and much more if the DMS 25/5 is the one installed. So this type of mistake is not acceptable and it could blow up part of the pipes. You can receive a wrong pump, it happens, but you cannot install it and check nothing until someone come and notices it. So, in both case there is a serious issue and a concern regarding resistance of the pipeline and securing of the permanence of water supply.

- Option 1: the pump is the first type planned working at 12m3/h and then two pumps working 8hours per day cannot supply more than 200m3/day when the plan was to provide 400m3/day, and still we might face problem with the resistance of the pipe during the transitory regime (regime before reaching of the pump working point in which the pressure variation can show high variation).

- Option 2: The pump installed today implies high risk of damaged on the pipeline is especially in the existing configuration of system (inappropriate pipe PN and even diameter, presence of ¾ run valve generating important hydraulic hammer when manipulate, ad no protection against hydraulic hammer) at short and mid-term, and the quantity of water will still not match the initial plan. Furthermore, the energy consumption will be huge and not at all sustainable as running cost will be very high and impact on existing generator harmful.

Rough estimation of the hydraulic loses on the pressure pipeline based on the pumps use assumption mentioned on the existing lay out:

- Assumption from IOM “lay out”: working flow between 12 to 20m3/h (which is not very accurate), with DN (external diameter) 63 PN10 of HDPE pipe (Internal diameter: 54 mm), meaning a flow of min. 3,33 L/s (12m3/h) to max. 5,55 L/s (20m3/h),

- Estimation of hydraulic loses based on Colebrook formula to calculate the hydraulic loses coefficient, resolved with swamee and jain method of resolution, and Darcy Weisbach) with a roughness at 0,1mm, at min. 48m/km, means 96mCE (almost 10bars) of loses for the 2000m of the pipeline; and max. 254,6mCE (almost 25 bars) for 2000m so totally unrealistic. So, to calculate the pump head you need to add the difference of altitude, about 8m.

- Estimation of working point (very roughly has cannot get the pump characteristic curbs) if we add 7-8 meters of a roughly estimate difference of altitude between the pump and the outlet in the treatment plant, will be for the minimum expected flow around 10bars, so the risk of over pressure do exist (and will happen during transitory regime, but pipe can bear over pressure when it is occasional) and then the working point must be clearly defined (calculation of network curbs to define the interconnection between pump and network curbs) and monitor (water and pressure meter)

- Then according the mid or long term plan for the water supply system and the result of hydraulic calculation and monitoring visit of the IOM WASH Coordinator, the pipe or/and the pump should be more accurately selected and thus replaced considering as well energy efficiency to ensure as much as possible sustainability of the system and decrease running cost. And in any case, the pumps which have been installed by mistake must be changes.