Medical Education and Health Information in the North East of Syria

Health policy research for the HERNES project

Prepared by Expertise France

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MINISTÈRE DE L'EUROPE ET DES AFFAIRES ÉTRANGÈRES
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Abbreviations

ACU	Assistance Coordination Unit
ALS	Advance Life Support
ANC	Antenatal Care
BEmOC	Basic Emergency Obstetric Care
BLS	Basic Life Support
BMI	Body Mass Index
CDC	US Centers for Disease Control and Prevention
CDs	Communicable Diseases
CHWs	Community Health Workers
CMAM	Community-Based Management of Acute Malnutrition
DoH	Department of Health
EF	Expertise France
EH	electronic Health
EHSP	Essential Health Service Package
EMR	Electronic Medical Records
EPI	Epidemiology
EWARN	Early Warning and Response Network (the one led by the ACU)
EWARS	Early Warning and Response System (the one led by the MoH)
FP	Family Planning
GoS	Government of Syria
HeRAMS	Health Resources Availability Mapping System
HERNES	Health Recovery in North East Syria
HIS	Health Information System
HNAP	Humanitarian Needs Assessment Programme
HNO	Humanitarian Needs Overview
HSS	Health System Strengthening
HWG	Health Working Group
ICD-10	International Classification for Diseases Tenth Revision
ICT	Information and Communication Technology
IMCI	Integrated Management of Child Illnesses
INSO	International NGO Safety Organisation
IPC	Infection Protection and Control
IRC	International Rescue Committee
ISIS	Islamic State of Iraq and Syria
IYCF	Infant, Youth, and Child Feeding
KIIs	Key Informant Interviews
MAM	Moderate Acute Malnutrition
mH	mobile Health
Mhgap	Mental Health gap programme
MHPSS	Mental Health and Psychosocial Support
MoH	Ministry of Health

MOU	Memorandum of Understanding
MRFS	Medical Relief For Syria
MSF	Médecins Sans Frontières
MUAC	Middle Upper Arm Circumference
NCDs	Non-Communicable Diseases
NES	North East Syria
NGOs	Non-Governmental Organisations
PEN	Package of Essential NCDs
PHC	Primary Health Care
PNC	Postnatal Care
R4HSSS	Research for Health System Strengthening in Syria
RHIS	Routine Health Information System
RI	Relief International
RMNCH	Reproductive, Maternal, Newborn, and Child Health
SAM	Severe Acute Malnutrition
SAMS	Syrian American Medical Society
SANES	Self Administration of North East Syria
SBMOS	Syrian Board for Medical Specialities
SDG	Sustainable Development Goals
SEMA	Syrian Expatriate Medical Association
SOPs	Standards Operating Procedures
SSA	Surveillance System for Attacks
TB	Tuberculosis
THET	Tropical Health and Education Trust
TOT	Trainings of Trainers
UNFPA	United National Population Fund
UOSSM	Union for Medical and Relief and Organisations
USAID	United State Agency for International Development
VPN	Virtual Private Network
WASH	Water, Sanitation, and Hygiene
WHO	World Health Organization

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Executive Summary

In the initial design of the Health Recovery in North East Syria (HERNES II) project, Expertise France proposed to conduct two policy research on key pressing health issues in the region. The two topics were identified based on a consultation process with the health actors and the Health Working Group (HWG) in the NES. The aim of the first paper was to identify the current status of medical education and professional training in the NES; and the second paper aimed at identifying the current status of health information availability, management, and practices. Both papers are meant to inform the health actors on how to improve these two policy areas in the NES further.

Desk review for available literature and report was conducted, as well as 15 Key Informant Interviews, 6 institution based surveys for formal medical education, and 7 institution based questionnaire to assess available Routine Health Information Systems (RHIS). A validation workshop was also conducted on 6 October 2022 with the participation of 31 participants representing various health actors and academic institutions.

Medical Education

Formal Health Education

Since 2014, all government educational institutions in ISIS-controlled areas were closed. A few local health initiatives were launched in 2018 after ISIS was defeated, including the Rojava university's medical school. The following table presents all institutions offering formal medical education in the NES as of Oct 2022.

Institution	Affiliation	Location	Majors	Est.	No. students in all years
Al Furat University	MoHE GoS	Deir ez Zour city	Medicine	2006	300
			Dentistry		150
			Pharmacy		100
Rojava University	DoHE SANES	Qamishli	Medicine	2018	183
The Health Institute	MoH - GoS	Hasakeh	Technicians (e.g., ICU, anaesthesia)	1996	500
The Nursing School	MoH - GoS	Hasakeh	Nursing, Midwifery	1984	300
		Ar Raqqa	Moved to Hama city as of 2013		
The Health Institute	DoH - SANES	Hasakeh	Nursing, Midwifery, anaesthesia	2021	36 (nursing)

Postgraduate medical and speciality training in NES is limited to the national hospital in Qamishli, managed by the GoS MOH. Since 2011, interruptions and a decrease in resources have impacted the quality of training and the number of graduates. Currently, an estimated 20 resident doctors are in the hospital, with main specialities being Gynaecology, Paediatrics, General Surgery, and Internal Medicine.

Capacity development interventions

Humanitarian actors have provided educational interventions to scale up health workforce capacities in the NES since 2012. NGOs have played a major role in providing medical training, with an aim to fulfil

programmatic and donor requirements, as well as improve quality of care. These interventions have taken the form of online courses, workshops and mentorship activities, with an average of 1000 trainees annually across the NES. Topics covered include RMNCH, emergency medicine, trauma care and COVID-19 case management, yet areas such as IMCI, NCDs, vaccination, EPI, health financing and general health policy and management have been missing. Giving the nature of the humanitarian response, these interventions may be characterised according to KIIs by being short termed and have little follow up.

In spite of this, good practices were identified in the humanitarian response in relation to medical education in the NES: collaboration with regional academic institutions, centralised training provision through the HWG, the use of technology and e-learning, and diaspora involvement in medical training and clinical supervision.

Next steps for medical education in the NES

To improve formal medical education in Syria, there is a need to support local initiatives to produce new health workers and contribute to the health labour market. An effective communication channel between NGOs and local medical schools could be developed mediated by the HWG and the recently created HSS sub-working group. NGOs are encouraged to host clinical training in their health facilities and support medical schools in developing appropriate curricula. Utilising the expertise of Syrian diaspora, particularly for postgraduate education and training, is also a key step, with the Syrian Board of Medical Specialities (SBOMS) serving as a role model for this. Furthermore, the LHAs and medical schools could be supported to set up a sub-national council for higher education for medical education to ensure all medical schools are meeting the necessary standards. Finally, there could be more advocacy efforts to attract funding as well as academic partnerships for local medical education initiatives from international and regional academic institutes and donors.

In order to advance informal medical education and training in Northeast Syria, the following recommendations are proposed. **First**, a joint needs assessment should be conducted in order to identify the training needs of the health workforce. **Second**, a map could be developed to show the availability of training infrastructure, whether linked to the above mentioned educational institutions or linked to NGOs and humanitarian actors, as well as trainers both inside Syria and from outside. **Third**, packages of trainings to be developed at the healthcare worker group (HWG) level. **Fourth**, more use of accredited online courses could be made. **Fifth**, NGOs to increase the use Trainings of Trainers (TOT) in order to expand the availability of local trainers. **Sixth**, resources such as training infrastructure, materials, and expertise should be shared in order to maximize the efficiency of the training program. **Finally**, the expertise available from the Syrian diaspora could be better utilized in order to provide local facilitation. Follow up supervision and mentorship schemes could also be developed to evaluate the application of the acquired knowledge, which should be linked to performance reviews.

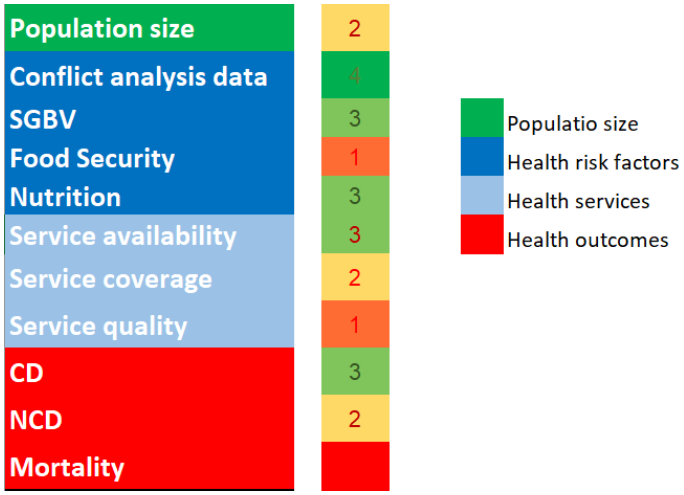
Health Information

Availability of the public health information domains in the NES

Domain	Available information	Methods used	Agency

Population size and composition	HNO	Self-reporting by humanitarian actors	UN-OCHA
	HNAP	Community based household surveys	Multiple Syrian NGOs and UN agencies
	Population dashboards	Ad-hoc surveys, informal comms.	REACH initiative
	Programmatic data	Nutrition screening, RMNCH services	MSF, Save Children, Mehad, other NGOs
Exposure to armed attacks	Security incidents data	Incident reporting, field focal points	INSO
	SSA database	Facility based surveillance	WHO
	LiveUAmap – Syria	Social media	LiveUAmap
	WPCS weekly reports	Social media, conflict analysis.	COAR Syria
	Security analysis	Incidents reporting + security analysis	Most NGOs
SGBV	Internal databases	Facility based surveillance of SGBV cases	Most NGOs with little role for UNFPA
Food Security	Multiple ad-hoc reports	Household surveys – Market analysis	Self reporting
Nutritional status	MUAC Screening	Facility based and community based screening	MSF, Save Children, Mehad, other NGOs
	Malnutrition case tracker	MAM and SAM programming	MSF, IRC, Save Children
Service Availability	HERMAS	Self reporting (limited)	WHO (Whole of Syria)
	4Ws	Self reporting	HWG
	Facility mapping	Self reporting	HWG
Service coverage	Limited programming data		
Service Quality	M&E reports	Facility based field visits + exit interviews	Self reporting
	RHIS data	Programmatic data	Self reporting
CDs	EWARN	Facility based surveillance + field focal points	ACU
	EWARS	Facility based surveillance	MOH
	KRC surveillance	Facility based surveillance + field focal points	KRC – DOH
	Water born CDs dashboard	Self reporting	HWG
NCDs	Programmatic data	RHIS	Multiple NGOs
	NCDs tracker	RHIS + case tracker	Mehad
Mental Health	Mental health case trackers	Limited programming data (MPHSS + mhGAP)	Multiple NGOs
Mortality	NA	NA	NA

We gave scores from 0 to 4 for each set of health information of these above mentioned domains. The score depends on the number and the quality of available databases and sources of information for each category. The following diagram summarises the scoring of the main public health information domains in the NES. The colour scheme gives red for the least available information (score=0) and green for the most available information (score=4).



Routine Health Information Systems (RHIS) in the NES

We identified an absence of any comprehensive RHIS system at the national level, which included any form of paper-based or basic RHIS. All routine health information available on national level was gathered informally through individual communication and ad-hoc self-reporting. In response, the Department of Health (DOH) has recently established a new office for statistics; however, our study found this office to lack the necessary resources in terms of personnel, technical and financial capacities.

In the NES, the only reliable RHIS systems are those used by NGOs. The governance and policies of these systems have shown substantial gaps. Despite high commitment to HIS from senior leadership, limited prioritisation has been seen, resulting in health indicators developed for donor reporting that have limited alignment. Furthermore, there has been limited use of international standardisation and definition such as the use of the ICD-10. At least 5 large NGOs are using electronic HIS, which collectively constitutes around 40% of health facilities in the region. Data confidentiality appears to be strong. There is potential for the use of e-health and m-health, and the use of ICD10 is emerging in all of the electronic medical record systems. Power PI is also widely used for dashboards and visualizations.

The following table presents three examples of the NGOs run RHIS systems in the NES with the key features of these systems:

	Mehad	**RI**	**IRC**
launched	2020	2019	2019
Software and programming	SQL server – Visual Studio	MS Access (BVA language)	MS Access + CommCare for some services (MH, NUT, IPC)
Paper based	All systems use patients' registries to back up the electronic records. Both systems are linked through patients' identifiers.		
Data flows	All systems use similar data flows from patient forms to summary tools (such as tally sheets) to a periodic aggregate reporting form.		

Data entry interactions	Software in Arabic and English	Arabic and English forms	MS Access (English only)
Data retrieving	Using ID + other different variables (such as name, residency status, age, gender) the system can retrieve records in case of revisits.		
Paper Data repository	Paper records are stored and archived inside the facility.		
E – data repository	SQL server	Online cloud	Online cloud
Morbidities tracked	>100 morbidities with case definitions	>600 morbidities with case definitions	>100 morbidities
Prescriptions tracking	No	Yes. >600 drugs	No
Data transfer	Online/offline		
Data dissemination	Power BI – Dashboards – weekly and monthly reports – reports to the HWG as per the reporting requirements - Reports are shared with partners and donors		
		Monthly reports to the local health committees	

A road map for Routine HIS in the NES

The proposed road map has two phases, transitional and long term. The transitional phase should begin with the (**1) establishing a dedicated sub working group for health information** management at the HWG level. This group should work on **(2) developing a set of health indicators**. This set can be built based on the existing efforts related to the Essential Health Service Package at Primary and Secondary health care levels. The development of this set could also utilise the WHO's Global Reference List of 100 Core Health Indicators that was developed in 2018. This should be coupled with the development of case definitions according to the International Classification of Diseases 10th Revision (ICD-10) and other relevant standards. This could be followed by **(3) the development of national policies and guidelines for RHIS** including specific protocols for data collection, data confidentiality and privacy, and information sharing and dissemination. Finally, the group is encouraged to build **(4) new dashboards for sharing data of the agreed set of indicators**.

Then the long term phase for the road map will aim at developing health information management and practices to coordinate and harmonise the use of health information to inform health policy and planning. Harmonising existing health information systems and software, involving the local health authorities in health information planning and information sharing, expanding the implementation of the DHIS2 or other software, gradually shifting the ownership of the regional and central health information systems to the local health authorities, and exploring ways to harmonise approaches of health information management between the NES and the other areas of control in Syria are all key components to achieving this goal. The implementation of these steps will ensure that the road map to develop health information management and practices in the NES is successful and will ultimately lead to better informed health policy and planning.

1. Background and context

1.1. Introduction

Over the past 11 years, the conflict in Syria has taken a significant toll on the country's health system. In North East Syria (NES), existing data indicates that the health system in the region suffers critical weaknesses and fragmentation. The health system in this region had suffered from years of negligence from the central government in Damascus before the conflict. The health infrastructure and the available health resources in the NES were much less than those available to other governorates in Syria. For example, some documents by the Damascus Ministry of Health (MOH) indicate that in the year of 2009 the number of hospitals beds per 1000 population in Ar Raqqa governorate was less than 1 bed for each 1000 population compared to 2.6 beds in the governorates of Tartus and Lattakia.[1] Most of the health policies in the region were centrally designed by the MOH in Damascus with very little attention to the local specificities in the NES.

During the conflict, these weaknesses of the health system in the NES were further pronounced. Years of Islamic State of Iraq and Syria (ISIS) control and large-scale military campaigns led by the Global Coalition to defeat the extremist group have devastated the area's health infrastructure and service provision, which were already under-resourced and deprioritised relative to other areas of the country before the conflict.

Preliminary reports and observations suggest general weaknesses in the health system in the NES, which might be particularly pronounced in the Raqqa and Deir-ez-Zor Governorates. In a 2018 Annual Report on the state of public health centres across Syria, the World Health Organization (WHO) found that only 1 out of 278 were fully functioning in Ar-Raqqa, Deir-ez-Zor, and Al-Hasakeh. More than half (173 out of 278) were not functioning at all.[2] The COVID-19 outbreak might have further weakened the health system in the NES with limited testing, treatment, and preventative measures.

Currently, the health system in the NES is led by a variety of actors that can be classified into governmental and grassroots actors, that are coordinated by the Department of Health (DoH) of the Self Administration of North East Syria (SANES), and humanitarian and non-governmental actors, that are coordinated through the Health Working Group (HWG). Recently in 2022, there have been some efforts to develop some health policies, guidelines, and protocols on the NES level. The HWG led various exercises to strengthen the health system in the region through development of some technical guidelines, such as medical waste management and package of essential health services. In parallel, the DoH initiated a process to develop a national health law for the NES region. This process involved some experts from humanitarian and academic actors.

In the initial design of the Health Recovery in North East Syria (HERNES II) project, Expertise France proposed to conduct two policy research on key pressing health issues in the region. Learning from the HERNES I project, the project team identified critical gaps in the health policies in the region, which reflects weaknesses in the fragmented health system in the NES. The HERNES I included two studies; one on

[1] Documents from Damascus MOH obtained through unpublished PhD thesis, Abdulkarim Ekzayez, King's College London, 2022.
[2] WHO, HeRAMS Annual Report: Public Health Centres in the Syrian Arab Republic, January - December 2018, 2019.

Reproductive, Maternal, Newborn, and Child Health (RMNCH), and another on health and stabilisation. There was a need to have more policy oriented research to support the development of health policies in the NES. This is mainly to inform health planning and decision making not only for the current phase of the health system but also for the early recovery and development phases.

With the start of HERNES II project in early 2022, the project started initiating some discussions at the HWG level on current status of health policies in the NES. At the same time we conducted a desk review on past and current research on health policy issues in the NES. We found a dearth of available data and research in this field. Some of the areas that received some attention recently include:

- Reproductive, Maternal, Newborn, and Child Health (RMNCH): there were a couple of research conducted by Expertise France in the last two years on the availability, accessibility, and quality of RMNCH services in the region. The reports are available publicly.
- Health system governance and the COVID response: there was a research conducted by several organisations for United State Agency for International Development (USAID) in 2020 on the readiness and preparedness of the health system in the NES to respond to the COVID-19 outbreak. The research assess broadly the six building blocks of the health system as per the WHO health system framework. However, the report was not found to be available publicly.
- Private sector role in the health sector in the NES: this research project was initiated by UOSSM France and it is still ongoing.
- Health and stabilisation in the NES: this research was conducted by Expertise France last year and looked at the contributions of the health sector to stabilisations efforts in the NES. The report is available publicly.

The desk review was followed with a consultation process with the HWG coordination team and with some health actors in the region. During this process, we identified a list of seven key health priorities that included:

- Health workforce: wages, management, and retention
- Medical education: undergraduate and postgraduate
- Health Information Management System
- Health governance and leadership
- The role of private sector in the health system in the NES.
- Medical supply chain management
- Outreach health interventions: for example, community health workers

We then developed a survey that was shared in April 2022 with all health actors in the NES to prioritise between these seven research topics. In the survey we asked all health actors to identify the top two health policy priorities in the NES out of the above list. Among the 16 responders, health information management stood out to be the most prioritised health policy issue among 56% of the responses. This is followed by medical education which received 44% of the votes. The following diagram summarises the answers we received when we asked the question: “Please choose the top two health policy issues that you think should be prioritised for research and policy development in the NES”.

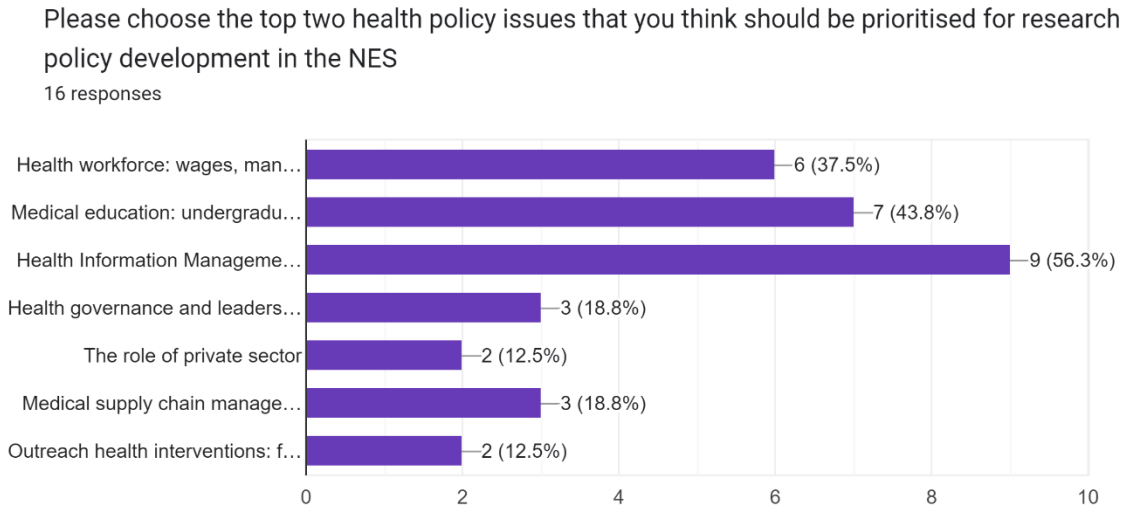


FIGURE 1 TOP PRIORITIES FOR HEALTH POLICY ISSUES IN THE NES

2. Medical education in the NES

2.1. Introduction

Medical education usually does not receive adequate attention in conflict settings due to other pressing priorities, most of which are related to life saving and humanitarian interventions. In chronic protracted conflicts, however, the extended de-prioritisation of medical education could result in critical gaps in health labour market due to chronic shortages in health workforce. Therefore, there have been a growing attention in the two decades to the need of strengthening medical education in protracted conflict crises (1).

The Syrian conflict is a perfect example of how a conflict can drastically disrupt medical education and consequently the availability and the quality of medical care. Before the conflict, medical education in Syria was relatively well established, with medical schools located in several major cities such as Damascus, Aleppo, Lattakia and Homs. Although the medical schools were not necessarily of the highest quality and did not offer the most up-to-date medical training, Syrian medical graduates used to be perceived to have a good medical knowledge as proved by the relevant international medical examinations. These high achievements of Syrian doctors stayed true even during the conflict. A study analysing trends in the performance of Syrian physicians in the National Resident Matching Program in the United States of America between 2017 and 2019 found that Syrian doctors have a higher match rate compared to all non-USA international medical graduates (2).

Since the start of the conflict in 2011, medical education in Syria has been drastically affected. Many of the medical schools have been destroyed, along with the hospitals and other medical facilities. This has caused a severe shortage of health workers in Syria, as medical students and practitioners have either been killed or have fled the country, with limited possibility to rectify these gasp due to interruptions and disruptions in the traditional medical education system in the country. Areas out of the control of the Government of Syria (GoS) were disproportionally affected being out of the coverage of the traditional medical schools that are all located in GoS controlled areas. Students in areas out of the GoS control have no or very limited access to these medical schools. This has led to a decrease in quality of medical care in Syria generally, and in non governmental controlled areas specially, as many of the practitioners are not adequately trained (3–5).

Consequently, the disruptions in the medical education in Syria led to critical shortages of healthcare workers. The latest Health Resources Availability Mapping System (HeRAMS) report released in December 2021 by the WHO estimates that there are 3,830 specialised doctors and 8,412 resident doctors in the whole country (6). This translates into 0.63 physician (either specialist or resident doctor) per 1000 people, which is much below the rate of other countries (Lebanon 2.1 as of 2018, Jordan 2.3 as of 2017 – as per the World Bank data).

2.2. Medical education in northeast Syria before the conflict

Similar to other aspects of development, north-eastern governorates in Syria had lower levels of medical education compared to the other governorates. Students from these governorates, therefore, were encouraged to apply for medical colleges benefiting from less strict eligibility criteria compared to students

from other governorates. Moreover, the Ministry of High Education in Damascus established Al Furat University in 2006 with 25 colleges distributed across the three governorates of northeast Syria, and a medical school in Deir ez-Zour city.[3] In 2010, the medical school of Al Furat University had an estimated 400 students distributed across the six years of study. The university used to provide undergraduate and postgraduate medical education and training in several medical specialties, including general surgery, paediatrics, obstetrics and gynaecology, pathology, and internal medicine.

Undergraduate medical education at Al Furat University was based on existing medical accreditation and curriculum established by other Syrian public universities and is regulated by the Ministry of Higher Education in Syria. Students must complete a six-year course of study, including three years of pre-clinical training, two years of clinical training, and one year of internship. During the pre-clinical training, students receive theoretical and practical instruction in the basic medical sciences, such as anatomy, physiology, biochemistry, pathology, and pharmacology. During the clinical training, students receive hands-on experience in a hospital setting and learn the foundations of medicine. The internship year provides students with the opportunity to develop their clinical skills and gain practical experience.

Postgraduate medical education in the region was regulated by the Ministry of Health in Syria. Students must complete residency programs, with various lengths, in order to become specialist doctors. The residency program is divided into two stages. During the first stage, students receive instruction in the basic sciences and clinical skills relevant to the specialty they are pursuing. During the second stage, students receive instruction in the advanced clinical skills and techniques related to their specialty.

The conflict in Syria has had a devastating impact on medical education in northeast Syria. The emergence of ISIS in this region interrupted all institutions and caused critical gaps in medical education. This is coupled with violence and destruction and deterioration of all aspects of life have caused many of teaching staff and specialised doctors to flee the country. Many of the facilities of Al Furat University have been damaged or destroyed. As a result, the availability and the quality of medical education has suffered, and many of the students and resident doctors have been unable to complete their studies. Some students managed to resume their studies in GoS controlled areas; some other students were unable to access educational institutions in GoS areas due to security concerns.

2.3. Aims and Objectives

The main objective of this study is to assess the current status of medical education for health workforce in the NES.

The detailed objectives of this study include:

- Examine the current practices related to undergraduate and postgraduate medical education;
- Investigate the availability of medication education institutions and/or initiatives;
- Assess the main features of the current medical education institutions and initiatives in the NES.
- Explore ways to support the health labour market in the NES based on available medical education practices.

[3] Al Furat University website: https://alfuratuniv.edu.sy/index.php?set=3&lang=1&id=270&act=270

2.4. Methodology

The study started with a desk review of available literature and reports. We found a dearth of data available on medical education in the NES. The review included documents from the Ministry of High Education and the Ministry of Health of the GoS.

The team then conducted 15 Key Informant Interviews (KIIs) with key stakeholders involved in formal and informal medical education interventions in the NES. We conducted two types of KIIs:

- The first type was targeting actors involved in formal medical education, such as faculty members of local universities and institutions. We conducted 6 of these interviews alongside with informal conversations with local informants that helped us better understand the context.
- The second type of interviews was targeting Non-Governmental Organisations (NGOs) actors. The aim of this type was to collect data on informal medical education initiatives and trainings that are provided by NGOs. We conducted 9 interviews of this type.

Based on the initial findings of the desk review as well as the KIIs, a quantitative survey was then developed to assess the medical education institutions in the region. Six surveys were filled in the identified six institutions that provide formal medical education in the NES.

Lastly, a validation workshop was conducted in Erbil on 6 October 2022 to ensure that our findings and recommendations are jointly produced with interested actors in the region. The workshop was attended by 18 physical attendees and 13 online participants. The attendees were representative of:

- NGOs: UPP, IRC, RI, SAMS, AFH, MDM, IDA, UOSSM France (Sawsan).
- Local actors: Department of Health of SANES, EF's field team.
- Academic actors: Rojava university, the medical institute in Hasakeh.

During the workshop, we presented our initial findings and received feedback and comments that complemented some of the gaps in our data. We also had group work to further analyse our findings and shape the recommendations.

2.5. Formal medical education in the NES

Since the emergency of the ISIS in 2014, all governmental educational institutions in ISIS controlled areas were suspended. Institutions that are based in Al Hasakeh governorate, such as the Health Institute of Al Hasakeh city, remained open but with very limited resources. With the defeat of ISIS in 2018, new local authorities in the region started few medical educational initiatives, such as the medical school of the Rojava university. In our study, we screened all institutions that provide formal medical education in the NES as of October 2022.

TABLE 1 LIST OF ALL INSTITUTES THAT PROVIDE FORMAL MEDICAL EDUCATION IN THE NES

Institution	Affiliation	Location	Majors	Est.	No. students	Recognition of certificate

Al Furat University	MoHE GoS	Deir ez Zour city	Medicine	2006	300	Certified by the MoHE – recognised in Syria and internationally
			Dentistry		150	
			Pharmacy		100	
Rojava University	DoHE SANES	Qamishli	Medicine	2018	183	Recognised only in NES
The Health Institute	MoH - GoS	Hasakeh	Technicians (e.g., ICU, anaesthesia)	1996	500	Certified by the MOH – recognised in Syria and internationally
The Nursing School	MoH - GoS	Hasakeh	Nursing, Midwifery	1984	300	
		Ar Raqqa	Moved to Hama city as of 2013			
The Health Institute	DoH - SANES	Hasakeh	Nursing, Midwifery, anaesthesia	2021	36 (nursing)	Recognised only in NES

2.5.1. Al Furat University

Al Furat university is located in Deir ez Zour city, which is under the control of the GoS. We included this university, however, in our analysis because it used to serve the population of the NES. There are still some students from the NES pursue their undergraduate medical degree from this university. Similar to all other GoS medical schools, such as Damascus and Aleppo universities, there are many barriers that hinder the accessibility of Al Furat medical school by residents of the NES. The main barrier is safety and security considering challenges not only during crossing the line between the two areas of control, but also challenges related to military conscription and possible detention by the GoS security agencies. Male students fear going to the university to avoid being forced to join the military conscription. Al Furat University is affiliated and accredited by the Ministry of Higher Education of the GoS.

The available resources for the university became very limited during the conflict. The university ceased most of their activities during the ISIS control period, and all students were relocated to other public universities. However, after the defeat of ISIS, the university resumed activities but with reduced scale. Most of the former teaching staff left the university to join other public universities or to flee the country. Currently, the medical school does not have any PhD holders as part of the teaching staff. While we were not able to get information on the school annual budget, we understood that the financial resources available from the Ministry of High Education are very limited compared to other public universities. Studying in the university, however, remains free of charge with symbolic enrolment fees.

As of 2022, there were about 300 medical students in the medical school of Al Furat university. Additionally, there were about 150 students in the dentistry school and less than 100 students in the faculty of pharmacy.

2.5.2. Rojava University

The idea of the Rojava university started in 2017 in response to the interruption of high education in the region and the need to have educated workforce. In particular, the need for medical personnel was deemed of paramount importance, and the academy of medical sciences was opened in Serêkaniyê, a district of Al Hasakeh governorate. The academy offered specializations in human medicine and nursing, employing a teaching staff of doctors, pharmacists, and local teachers. In order to improve teaching conditions and educational capabilities, the academy's headquarters were moved to Qamishli city in 2018.

Since then, the academy has graduated three batches of nursing students and has admitted students into the Department of Human Medicine for three consecutive years. In 2019, the academy was converted into a medical school within the University of Rojava. This conversion was intended to improve the educational process by allowing students to be admitted in accordance with the admission eligibility of the University of Rojava.

The selection process for admission to the college is based on the differentiation system approved by Rojava University, which requires students to have a secondary school diploma. The college adopts a 12 semester system distributed over six years. The curriculum has 85 modules, with 10 months of clinical trainings as rotations in DOH supported health facilities. The first year consists of a preparatory stage necessary for students to be eligible for study and the eleventh and twelfth semesters are devoted to practical training in hospitals. Students are exposed to theoretical materials and practical training and receive a bachelor’s degree in medicine upon graduation.

Graduates of the Faculty of Medicine at the University of Rojava can practice the medical profession as general practitioners in private clinics or public and private hospitals in the NES licensed by the DOH of the SANES. The college plans to launch a high studies program for medical specialisation so graduates can choose to specialise in DOH supported facilities. These plans, however, lack the resources to turn them into practice. The faculty currently has 183 students enrolled in all years, with 21 set to graduate in the academic year 2023/2024. It is worth noting that the faculty does not charge any tuition fees.

For human resources, the medical school has three administrative staff and three core teaching staff. Every term, the college contract additional teaching staff to be involved in academic teaching. The teaching staff are holders of postgraduate certificates from GoS universities and the Syrian Board. The curriculum followed is the same as the curriculum of the Faculty of Human Medicine at the University of Damascus.

In addition to its work in teaching, the medical school takes lead in medical examinations from human medicine, pharmacy, and dentistry for foreign university graduates so they can work in the NES.

According to our KIIs, the main challenges facing the Faculty of Medicine of Rojava University are a lack of teaching staff, poor infrastructure, no university hospital, lack of student services such as accommodation and transportation, and a bad socio-economic status in the region. Students and families prioritise jobs and activities that can support their livelihood over going to a university.

In order to address these challenges, there is a need to focus on gaps in postgraduate specialist training such as oncology, jurisprudence, and mental health. The faculty also needs to develop clinical trainings with NGOs, support infrastructure, and foster regional and international collaboration.

2.5.3. The Health Institute - GoS

The Health Institute of Al Hasakeh City was founded in 1996 by the Ministry of Health (MOH) and the Ministry of High Education in the city of Hasakeh. The aim was to encourage residents of the NES to engage in the health labour market in order to overcome the shortages of health workforce in this region. The institute has a long history of teaching as per the central curriculum of health institutes across the GoS educational institutions. The institute teaches mainly medical technicians who have a range of specialities including ICU, emergency medicine, surgery, and palliative care.

Studying is free of charge with only symbolic enrolment fee of 2,000 Syrian Pounds. The institute used to have good financial and human resources before the conflict. Currently, however, the institute has only 8 administrative staff with limited teaching staff that vary from year to year. Limited financial resources and low wages mean staff retention is a major issue. Most of the staff wait from better opportunities with NGOs and other sectors to leave the institute. The institute has large educational spaces and good infrastructure, however, the institute is lacking in terms of equipment and resources. The current annual budget stands at about 16,000 US Dollars, which is slightly more than the nursing school in the same city.

The curriculums are still the same as those offered by other GoS health institutes in the GoS held areas. The institute runs a two-year course which is divided into four terms and twenty modules. Currently, there are about 500 students enrolled. The high number of students is linked to the employment scheme of the GoS MOH that is associated with this institute. Upon completion of their studies, 100% of graduates are recruited by the Damascus MOH.

2.5.4. The Nursing School - GoS

The nursing school of Al Hasakeh City is one of the oldest medical educational institutions in the region. It was founded in 1984 by the MOH. The aim was to encourage residents of the NES to engage in the health labour market in order to overcome the shortages of health workforce in this region. The institute has a long history of teaching as per the central curriculum of health institutes across the GoS educational institutions.

Studying is free of charge with only symbolic enrolment fee of 1,000 Syrian Pounds. The institute used to have good financial and human resources before the conflict. Currently, the institute still has good human resources compared to other educational institutions in the region with 12 administrative staff and 20 teaching staff, most of whom are holders of nursing diplomas from MOH. According to our KIIs, limited financial resources and low wages also affect staff retention in this institute. The institute has large educational spaces and good infrastructure; however, the institute is lacking in terms of equipment and resources. The current annual budget stands at about 5,000 US Dollars only.

The curriculums are still the same as those offered by other GoS nursing schools in the GoS held areas. The school runs a three-year course which is divided into nine terms and 34 modules. Currently, there are about 300 students enrolled. The high number of students is linked to the employment scheme of the GoS MOH that is associated with this school. Upon completion of their studies, 100% of graduates are recruited by the Damascus MOH to work in health facilities supported by the MOH in the NES.

It is worth mentioning that there was another nursing school affiliated with the MOH located in Ar Raqqa city. This school, however, was moved to Hasakeh city first in 2013 and then to Hama city in GoS controlled areas in 2015. This nursing school is currently merged with the nursing school of Hama city.

2.5.5. The Health Institute - SANES

The Health Institute in Hasakeh city was founded in 2021 by the Department of Health of the Self Administration of Northeast Syria (SANES). This was in response of the critical needs for various specialities of health workforce in the region, with a focus on nursing and technicians who can fill the gaps of other specialities if given further training. The institutes aims to bridge the gaps in the health workforce in the region, and to ensure that the residents of the city are provided with quality health care services.

The institute has 12 administrative staff and 12 teaching staff. Most of the teaching staff are holders of nursing and medical institute certifications from GoS affiliated institutions. The institute offers three specialties: nursing, midwifery, and anesthesia. Each specialty is two years long and consists of four terms, with 36 modules in total. Currently, the institute accommodates 36 students in the nursing school, while the number of students for other specialties vary. The Health Institute follows the same curriculum of the health institutes of GoS counterpart institutions. Clinical trainings are available in supported facilities of the Department of Health. The duration of the study is two years, with 36 modules. The institute provides an opportunity for residents of the NES city to receive medical education, and to become part of the health workforce in the region.

Challenges facing this institute are mainly related to accreditation and resources. The certificate of this institute is only recognised by the local health authorities in the NES. Graduates, therefore, can only have licenced work in the NES. Financial constraints and limited resources are also major challenges facing the institute, especially in relation to human resources available as teaching staff in the institute considering the severe shortages of qualified supervisors and mentors in the region.

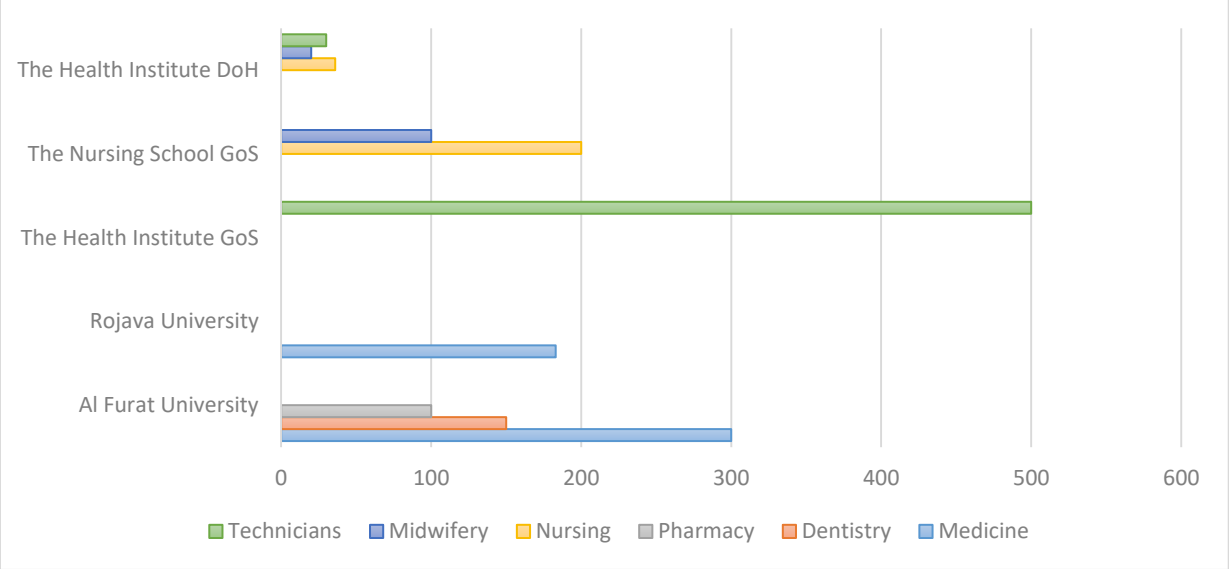


FIGURE 2 UNDERGRADUATE STUDENTS IN MAJOR MEDICAL EDUCATIONAL INSTITUTES IN THE NES - 2022

2.5.6. Postgraduate medical training

Postgraduate medical training and medical speciality training in the NES is limited to the national hospital in Qamishli city, which is run by the GoS – MOH. This medical speciality training is part of the MoH residency programme that runs in all major national hospitals across the country and is managed by the relevant health directorate in each governorate. Since the start of the conflict in 2011, there have been some interruptions in the residency programme in the Qamishli national hospital corresponding to the times when this hospital had to close or reduce activities because of military and political factors. The number of consultants and supervisors have also dropped from more than 50 consultants before the conflict to less than 20. The quality of provided training was affected accordingly by the limitations in human and financial resources. The number of medical graduates in this residency programme vary every year with an estimated number of about 20 resident doctors currently in the hospital as reported by our key informant interviews. Some of the speciality training programme had to stop due to interruptions in the relevant services in the hospital or the absence of consultants and supervisors. The current major speciality trainings provided in the Qamishli national hospital are: Gynaecology, paediatric medicine, general surgery, and internal medicine.

2.6. Capacity Development Interventions

With the start of the humanitarian response in the NES since 2012 and in light of the shortages in the health workforce, humanitarian actors have been engaged in various educational interventions that focus on scaling up the existing capacities of the health workforce to deliver humanitarian health interventions. With the defeat of ISIS in 2018 and the scaling up of the humanitarian response in the NES NGOs have played a pivotal role in providing medical training in this region. The initial aim of these trainings was to fulfil programmatic requirements and donors reporting. Gradually, the aim shifted to other areas such as improving the quality of care, ensuring standards and protocols are followed, and bringing in new interventions or treatments, and help in task shifting. These informal educational interventions have been provided in various forms, including online courses, face to face workshops, and some limited mentorship activities.

The majority of the trainings mentioned in this section refer to in-service training. Almost none of the informants mentioned having pre-service training in their organisations.

According to our surveys and interviews, the average of number of trainees across the NES can reach about 1000 participants annually. The courses have covered topics such as RMNCH, emergency medicine, and trauma care, health promotion, COVID-19 case management, IPC. There have been, however, key missing areas from these trainings such as Integrated Management of Child Illnesses (IMCI), Non-Communicable Diseases (NCDs), Vaccination, Public Health and Epidemiology (EPI), health financing, and general health policy and management. The following table summarises the key topics covered by NGOs provided trainings and the key missing areas:

TABLE 2 A LIST OF KEY TOPICS COVERED/MISSED BY NGOS

Provided trainings	Some missing areas
RMNCH (e.g.; ANC, BEmOC, PNC, FP, midwifery, Sexual and reproductive health)	IMCI

IPC and waste management	PEN – NCD
COVID-19 case management	Vaccination
GBV (e.g; (SGBV, Clinical care for sexual assault survivors (intimate partner violence)	Public health – EPI
MHPSS and MHgap	Medical supply chain
Basic health information management	PHC – as per the new EHSP
Nutrition: IYCF	CMAM
BLS and ALS	CDs (e.g.; TB, Vector born, water born)
CHWs induction trainings	Health Information systems
General project management	Health financing
Health and hygiene promotion	Health management

The benefits of these information educational interventions were crucial to help local health workforce to develop their skills and knowledge to respond to the needs of their communities. The trainings have also enabled healthcare professionals to build networks and access resources to further enhance their service to their communities. Quality of care is being improved, as those receiving medical assistance are receiving more expertise and better outcomes. This is achieved through a range of approaches, such as advancing staff knowledge, and introducing new treatments and interventions. Furthermore, task shifting has enabled those with a variety of medical experience to gain a greater understanding of their roles and responsibilities.

Giving the nature of the humanitarian response, these interventions were characterised by being:

- Short termed: most of the provided trainings are 1-3 days courses.
- Narrow focused: the trainings focus on specific intervention such as Infection Protection and Control (IPC).
- Poor follow up: trainees are rarely followed up to ensure the received knowledge is used in the implementation of the health services.

2.6.1. Challenges and shortcomings of NGOs provided training

There are a number of challenges that face NGOs in the area of trainings and capacity building. Some of the key challenges that are mentioned by the KIIs and were confirmed by the survey findings are:

- Lack of central planning that is based on demands. Most trainings are provided to meet certain supply needs without prior capacity assessments. Additionally, there are no local nor central entities involved in capacity building planning and strategies. However, this challenge is being partially

overcome through the central coordination of capacity development activities that started at the HWG level. Examples of this central coordination are provided in section 2.6.2.

- Legalisation and accreditation: the lack of recognised formal medical educational institutes that can collaborate with NGOs to jointly produce such trainings is a key challenge. Health workers are less motivated to join structured courses or long term trainings if these trainings lack national and international accreditation.
- Standards and references: there are no agreed standards and references for the provided trainings. Most NGOs would follow certain international standards that are not necessarily applied locally. There is a need to balance between international, Damascus, and local followed standards.
- Access to the internet: the majority of trainings are provided virtually especially during the COVID-19 outbreak. Reliable internet is essential to provide online trainings. Considering the various sanctions on Syria, there is also a need for Virtual Private Network (VPN) to access some educational platforms such as Coursera and Future Learn.
- Workload: considering the limited health workforce available in the region, workload is a key challenge that is preventing health workers from being able to commit time for trainings, especially if these trainings are more than one day long.
- Electricity: power cuts can interrupt both virtual and physical trainings. Some training spaces are not equipped with alternative sources of power such as generators and batteries.
- Language barriers can also be obstacles. Medical translation is challenging considering the sensitivity of medical language. Medicine and other health majors are used to be taught in Arabic in Syrian universities, so most health workers would only know medical terms in Arabic.
- Lack of training spaces and equipment, such as mannequins,

Considering all of these challenges and shortcomings, some informants highlighted the fact that some of the trainings provided by NGOs can do harm if for example unqualified persons are poorly trained to deliver sensitive health interventions with limited or no supervision.

2.6.2. Good practices for NGOs provided training

NGOs have built accumulative experience in the area of medical training and capacity building interventions. We highlight here some of the key successes and good practices where NGOs developed effective approaches for medical trainings in the NES to overcome some of the above mentioned challenges and shortcomings.

1. Collaboration with regional universities

In light of the limitations of nationally and internationally recognised educational institutes in the NES and the various political and contextual restrictions that hinder local academic collaborations, some NGOs started exploring collaborations with some regional universities such as Jordanian and Iraqi universities.

In our interviews, we explored the experience of the Syrian American Medical Society (SAMS) in initiating a regional collaboration with the Hashemite University in Jordan. The idea emerged after SAMS conducted a basic capacity assessment when they identified the need for structured trainings in the field of Mental Health and Psychosocial Support (MHPSS). Relying on personal connections and institutional networks,

SAMS identified an academic group at the Hashemite University who have relevant experience in the field of MHPSS. The concept of regional collaboration was also derived from previous experiences in northwest Syria where Turkish universities were involved in delivering formal and informal medical education in collaboration with Syrian NGOs.

The initial discussions were focused on establishing a 9 months professional diploma in the field of MHPSS fully accredited by the Hashemite University and\or the Jordanian University. The involved organisations explored possible internal processes within the two partners to facilitate the delivery of a structured. SAMS and the Jordanian universities agreed to use a participatory approach during the development of the curriculum of this diploma to ensure local priority setting and local ownership. The programme is supposed to target psychosocial workers and trained nurses who would like to be certified MHPSS workers.

The program, however, has not been launched yet during the writing of this report in December 2022. This was mainly due to challenges related to local accreditation and licensing, funding and resourcing, and the mismatch between academic policies and humanitarian conflict practicalities. There have been various discussions and efforts to overcome these challenges through indirectly engaging the local health authorities in this partnership, working closely with the regional academic universities to customise their policies to have more flexibility to work in conflict settings, and maximising advocacy efforts to attract more funding for such regional academic/humanitarian collaboration.

2. Centralised training on the HWG level

Training provision by NGOs operating in Northeast Syria is a complex process due to the current contextual challenges in the region and the lack of well structured UN-led coordination platforms. Each NGO, therefore, used to provide short courses of trainings targeting their own staff with limited coordination with other health actors in the region. Recently, some NGOs started to coordinate their training plans with other health actors using the HWG platform. During the COVID-19 outbreak, Mehad organisation provided several trainings such as trainings on COVID-19 case management. These trainings were not only targeting Mehad's facilities and staff, but were also extended to target other health actors and health workers in different types of health facilities. Some of this coordination was led by the HWG. Learning from this experience, Mehad used the same approach for other trainings such as Waste Management and IPC.

Another example is the work of Expertise France in the field of RMNCH trainings. Initially, EF developed a comprehensive package of trainings related to RMNCH with the aim to target staff involved in EF supported projects. However, the team realised that improving RMNCH services in the region require extending the capacity building interventions to as much as possible of the health workers across the region. EF conducted a study that assessed the situation of RMNCH services in the region and developed the training package further accordingly. The coordination of these trainings was done through the HWG inviting all health actors in the NES to participate in these trainings. The trainings were also used to collect further information related to RMNCH services and standards in the region. This information was used to develop the Essential Health Service Package for RMNCH services, which was another process that was also developed centrally with the HWG.

Provision of trainings centrally and jointly with the HWG ensured better use of resources, standardised approach for capacity building, and extended coverage of these interventions.

3. The use of technology and e-learning

Considering the challenges related to physical trainings, the use of online trainings and e-learning was a necessity in the NES. This necessity was further emphasized during the COVID-19 outbreak with the various restrictions on physical activities.

Some international NGOs used to have their own digital platforms for online learning and trainings. Médecins Sans Frontières (MSF) and International Rescue Committee (IRC) are two prominent examples in this regard. Both organisations use not only dedicated website platforms for capacity building interventions, but they use also different digital platforms such as mobile applications. The MSF's platform "Tembo" is an excellent example for digital platforms for learning and trainings, which has also an easy to use mobile application. The use of these digital platforms, however, is limited to internal staff only. Additionally, there have been limited use of these platforms for clinical trainings in the NES as reported by our informants. There should be more efforts to make staff aware of the availability of these platforms and encourage them to receive capacity building interventions through these platforms.

The use of technology and digital platforms is an important practice for informal medical education and trainings in conflict settings generally. Having a central digital platform for medical trainings that is accessible by all health workers in the NES could have a positive impact on medical knowledge in the region. Some examples from northwest Syria, such as the e-learning digital platform of the Syrian Board for Medical Specialities (SBOMS) and Ahl Syria platform, can be good examples to follow or to join in the NES.

4. Diaspora involvement in medical training

Considering the limitation in available medical trainers and mentors in the NES, some local organisations have been engaging with Syrian medical diaspora to be involved in delivering capacity building interventions. Since the start of the response in Syria in 2011, medical diaspora played vital roles in building the capacities of local health workers. This has been done either directly by the diaspora NGOs, such as SAMS, Union for Medical and Relief and Organisations (UOSSM), and Syrian Expatriate Medical Association (SEMA), or indirectly through individual expatriates who are engaged with for specific training interventions.

The involvement of medical Syrian diaspora in trainings is especially important when it comes to new knowledge and practices. Medical diaspora will more likely have latest updates on new treatments and practices. For instance, during the COVID-19 response Mehad has provided ICU trainings supported by Syrian specialists in France and in the USA. These specialists were also involved in mentoring the trainees in their workplaces to ensure they implement the knowledge they received. Such initiatives have proven to be effective in providing training and follow-up support to medical personnel in the region, and have been crucial in addressing the medical needs in Northeast Syria.

2.7. Next steps for medical education in the NES

Building upon the research presented above on beneficial approaches and primary deficiencies within both formal and informal medical training in the NES, a workshop was convened in Erbil on 6 October 2022 to assess how to elevate medical education in the NES. Subsequently, the outcomes of the group work were synthesised into crucial recommendations for both formal and informal education in the region.

- **Formal (pre-service) Education:**

For formal medical education, there is a need to support local initiatives so they can contribute to supporting the health labour market with new health workers. In order to ensure better coordination between NGOs and local medical schools, it is important to develop an effective communication channel between them. This will help the NGOs to provide the relevant support and guidance for the medical schools, as well as to identify the areas of improvement and provide appropriate resources. This coordination can be mediated by the HWG and the relevant sub working groups. Additionally, NGO's are encouraged to allow the local medical educational initiatives to conduct clinical training in their supported health facilities. NGOs can also help in the development of appropriate curricula for such clinical trainings.

The expertise available in the Syrian diaspora can be better utilised to improve medical education as well. This is especially important in relation to postgraduate education and training. The example of SBOMS stands out as a role model to follow, as they have already established a network of Syrian doctors and researchers that can provide valuable input into medical education initiatives.

Medical schools could also be encouraged to standardise approaches, curriculums, and standards. This will help ensure that the quality of medical education is consistent across the country, and that students are receiving the same level of education regardless of where they are studying.

In addition to this, there should be more advocacy efforts to attract more support and funding for local medical education initiatives. This can be achieved through international and regional partnerships, such as with organisations like the Research for Health System Strengthening in Syria (R4HSSS), Tropical Health and Education Trust (THET), Medical Royal Colleges in the UK, as well as with regional universities like universities in Jordan, Iraq, Lebanon, and the West Bank.

Finally, the LHAs and medical schools could be supported to establish a sub-national council for higher education for medical education that can initiate local processes for accreditation based on assessments of medical education institutions. This will help ensure that all medical schools in the region are meeting the necessary standards and that the quality of medical education is consistently high.

- **Informal (in-service) Education:**

In order to advance informal medical education and training in Northeast Syria, the following recommendations are proposed.

First, a joint needs assessment should be conducted in order to identify the training needs of the health workforce. This will provide a clear understanding of the gaps in knowledge and skills, as well as the areas of need for medical education and training. Such needs assessment should make use of existing assessments that were conducted by the various humanitarian actors.

Second, a map could be developed to show the availability of training infrastructure as well as trainers both inside Syria and from outside. This will make it easier to identify and access both local and external training resources.

Third, packages of trainings could be developed at the healthcare worker group (HWG) level. This will ensure sustainability of the training program by utilising existing packages and creating new ones that can be used in any future educational interventions.

Fourth, more use of accredited online courses could be made, such as courses available at international universities, INGOs, and e-learning platforms. This will allow medical personnel to access high quality medical training available online with the ability to get recognised certificates.

Fifth, NGOs to increase the use of Trainings of Trainers (TOT) in order to expand the availability of local trainers. These TOTs should have not only training materials, but also tool kits to help trainers deliver these trainings in the future.

Sixth, better coordination could be established between local medical schools and health providers in order to host clinical trainings and contribute to curriculum development.

Seventh, resources such as training infrastructure, materials, and expertise could be shared in order to maximize the efficiency of the training program.

Eighth, the expertise available from the Syrian diaspora could be better utilized in order to provide local facilitation.

Ninth, follow up supervision and mentorship schemes could also be developed to evaluate the application of the acquired knowledge, which should be linked to performance reviews.

Finally, these recommendations are intended to make medical education and training in Northeast Syria more effective, efficient, and accessible. In the transition phase, utilising local trainers, sharing resources, and providing online courses, the quality of medical training in the region can be improved. Furthermore, better coordination with local medical schools and the existing professional associations can ensure that the training program is both sustainable and effective. This will help the health actors to build sustainable programme of continued in-service training which is adequate for the required competencies for the different healthcare provider cadres. This can then be sustained through a leadership and a coordination by the local health authorities under the future local government.

3. Health Information in the NES

3.1. Introduction

Health Information management is a critical component of health systems. Access to reliable and timely health information is a necessary first step in providing effective health care and responding to public health emergencies. In conflict settings, however, the availability and quality of health information become significantly undermined. Conflicts tend to take place in environments where information systems are already fragile and incapable of providing reliable data that inform public health decisions and plans. This fragility usually exacerbates during conflicts, which leads to detrimental effects on provision of health services and quality of care.

Despite of the challenges related to health information management in conflict settings, there have been increased efforts in the last decade to increase the availability and quality of health information to inform health service delivery and health system strengthening interventions. New technologies have enabled some of the solutions that were not available previously. For example, in the Democratic Republic of Congo, a mobile health (mHealth) system was developed to improve the delivery of health services in conflict-affected areas. This system enabled real-time data collection, information sharing and analysis, and improved health service delivery. The system consists of a secure web-based platform that allows health workers to collect data in real-time, share information and analyse trends. The system was designed to maximize efficiency by automating data collection, allowing field workers to quickly and accurately collect information at the point of care. It also enables health workers to access patient records and other health-related information in real-time. It also allows also allows for information-sharing and analysis, enabling health workers to better understand their patients' health conditions, access information related to treatment protocols and provide more comprehensive care (7,8).

Improving health information management is especially important in protracted conflicts in order to pave the way for healthy transition to post conflict health systems (9). Considering the current phase of the conflict in Northeast Syria (NES), which is characterised by chronicity and relative stability compared to other areas of control in the country, there is more interest in stabilisation efforts. This is translated into more efforts to launch first steps towards Health System Strengthening (HSS) in the region. Almost all frameworks for HSS interventions have a substantial focus on health information management (10). There is a need to better understand the current status of health information management before initiating such investments. This study aims to develop a baseline for health information availability and practices in the NES.

3.2. Health information in Syria before and during the conflict

Prior to the conflict, although the public health system in Syria used to have relatively strong provision of health services health information management systems were weak and inadequate. Public health information was managed primarily through paper-based records, although some electronic records were used in some areas. For instance, communicable diseases were managed using a combination of paper-based records and electronic systems. The Ministry of Health (MoH) had developed a reporting system for communicable diseases, known as the surveillance system for communicable diseases. This system was used to monitor and respond to outbreaks of communicable diseases, as well as to provide data for public

health planning and policy-making. Non-communicable Diseases (NCDs) were managed in the public sector primarily through paper-based records. However, a large percentage of NCDs patients were used to seek healthcare in private clinics, some of which did have electronic data systems to manage NCDs information(11–13).

Patients' records were generally managed through paper-based records, which were managed by local health care providers with poor central management. Patients' records were stored in filing cabinets and in paper folders stored inside the health facilities using arbitrary archiving mechanisms. This has limited the possibilities for information sharing and communication between health care providers, which was done primarily through verbal communication and hand-written notes. These weaknesses affected the management options of health information in relation to storage, sharing and retrieval of patient records, which in turn affected the ability of tracking patient outcomes and quality of care.

The use of electronic records and technology was limited in Syria prior to the conflict, but more interest in applying new technologies in managing health information was gradually becoming more widespread. Some private clinics did develop basic electronic information systems to store, manage, and retrieve patients records. However, the conflict affected the possibility of implementing such systems in the public sector.

The Syrian conflict has had a devastating impact on the availability and quality of health information in Syria. Due to the collapse of the central governmental systems and services in non-governmental controlled areas of Syria coupled with the new realities such as population movements, data on all aspects of life, including health, became scarce. Health actors have had difficulty assessing the needs of the population, determining the availability of health services, and understanding the impact of the conflict on the health system. Additionally, the lack of data on health service use and patient outcomes has made it difficult to evaluate the effectiveness of the health response and identify service gaps.

To meet operational needs for the humanitarian response, NGOs had to implement new data collection systems that did not rely on pre-conflict or existing resources. Despite the emergence of new systems for data collection, analysis, and management, they were only utilized internally within the organisation that created them (14). These systems also were of limited use when it comes to health planning and local priority settings considering that they were developed to meet certain operational and reporting purposes. To improve the humanitarian health response in Syria and other crisis areas, it is essential to invest in data collection and use, M- and E-health technologies, capacity building, and strong technical and independent leadership.

3.3. Health information domains in conflict settings

As part of a series on health in humanitarian crises in 2017, the Lancet published a conceptual framework for health information in humanitarian conflict settings. Francesco Checchi and others reviewed all health information available in recent conflicts (between 2010 and 2017) and found that health information was available only in small minority of contexts. They developed a minimal essential set of health information that should be available in humanitarian conflict settings (15).

The researchers classified health information in conflict settings into various domains that incorporate different aspects and usage of data. These domains include main public health concerns that arise during

crises and how they influence each other in regard to key health outcomes (such as nutritional status and morbidity) and effects (including mental health, disability, and mortality). Additionally, humanitarian public health services (including Water, Sanitation, and Hygiene "WASH", nutrition, and healthcare) that seek to minimise excess health impacts that can be attributed to the crisis. The following figure summarises these domains for the minimal set of health information that should be available in conflict settings. For the purpose of this study, we relied on these domains as a conceptual framework that guided our research design, implementation, and analysis.

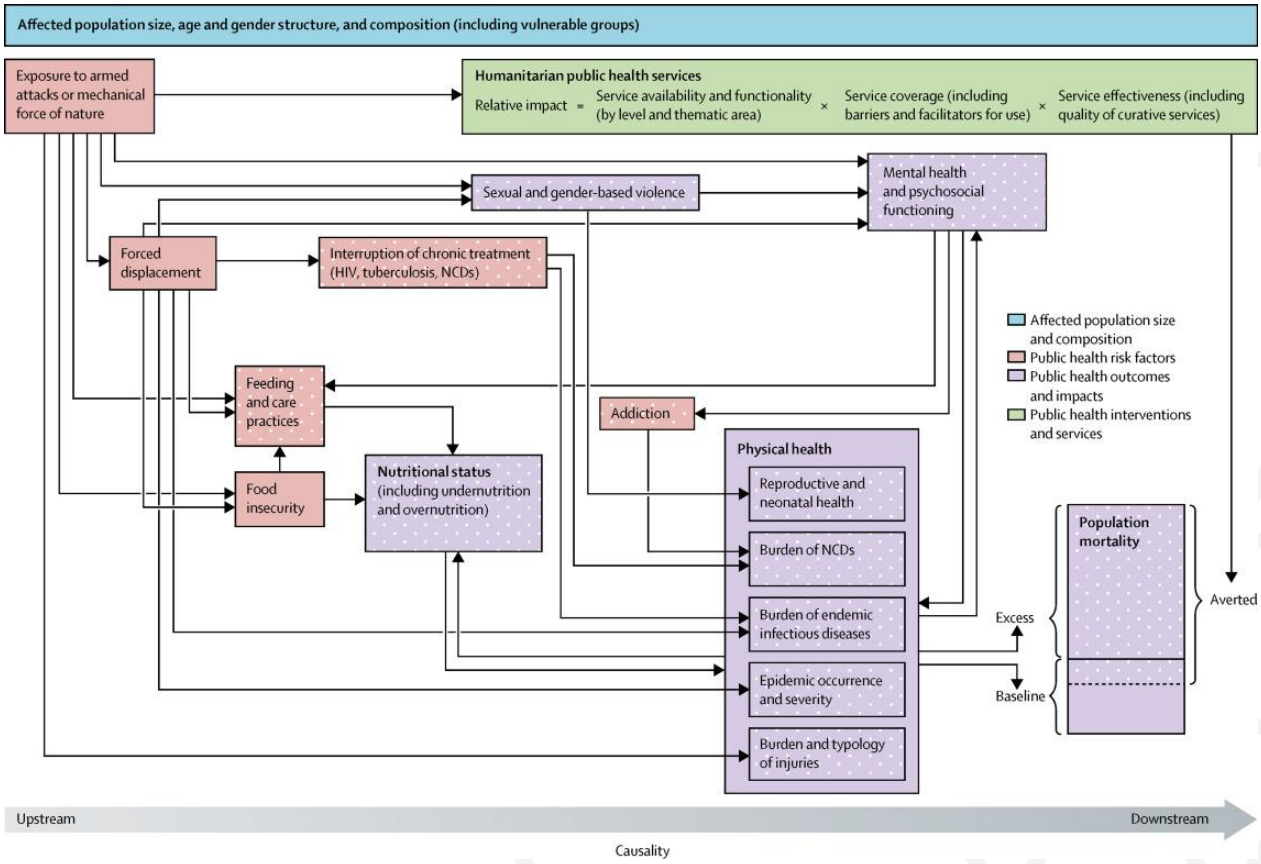


FIGURE 3 DOMAINS OF PUBLIC HEALTH INFORMATION IN HUMANITARIAN SETTINGS

3.4. Aims and Objectives

The main objective of this study is to assess the current status of health information management systems and practices in the NES. The study is meant to develop a baseline for health information to inform future programming for health system strengthening in the NES.

The detailed objectives of this study include:

- Examine the current practices related to collecting, managing, analysing, and using patients data by health actors in the NES;

- Examine the current practices related to collecting, managing, analysing, and using community health data by local health authorities and health coordination bodies in the NES;
- Examine the availability and quality of the various types of health data. This includes mortality, morbidities, determinants of health, management of the health humanitarian response, communicable diseases tracking and reporting.
- Investigate the availability of electronic medical records systems to manage health information.

3.5. Methodology

The study started with a **desk review** of available literature and reports. We reviewed reports from GoS ministries, the health cluster, the health working group, various humanitarian actors, and from the DOH of the SANES. We focused on organisations that are specialised in data even if they are not considered as health actors in the region, such as REACH initiative and the International NGO Safety Organisation (INSO).

The team then conducted 9 **Key Informant Interviews (KIIs)** with key stakeholders involved in managing health information mainly in the NGOs sector. During the desk review and the KIIs we assessed the availability and the quality of the various health information domains as stated in the minimal set of health information in humanitarian settings developed by Francesco Checchi and others (15).

We then assessed the availability and the quality of Routine Health Information Systems (RHIS), which can be defined as data collected regularly from public, private, and community health facilities and programs. They provide a snapshot of health status, services, and resources. Data is acquired by healthcare providers, supervisors, and surveys, and is sourced from individual health records, services delivered, and health resources (16). This assessment was done through a quantitative questionnaire, which is based on the assessment tool developed by the MEASURE evaluation project, which is funded by the United States Agency for International Development and has a mandate to strengthen health information systems (HIS) in low-resource settings. Our assessment focused on Electronic Medical Records (EMR) and their links to facility based or institution based RHIS.

Based on the initial findings of the desk review as well as the KIIs, we identified the main RHIS systems available in the NES. We prioritised systems that have electronic features over paper-based systems. We conducted the **quantitative assessment for 7 of the RHIS systems**, which all were developed by NGOs.

Lastly, a **validation workshop** was conducted in Erbil on 6 October 2022 to ensure that our findings and recommendations are jointly produced with interested actors in the region. During the workshop, we presented our initial findings and received feedback and comments that complemented some of the gaps in our data. We also had group work to further analyse our findings and shape the recommendations.

3.6. Availability of the public health information domains in the NES

3.6.1. Estimates of affected population size and composition

The lack of data on population size and composition in the NES is a major gap in health information, impairing the ability of health actors to plan and evaluate effectively. The central civil registry in Damascus is the only known national source of population-related information such as births, deaths, and age structure.

The SANES reported plans on conducting a complete census in the NES in 2023, but these plans are yet to be materialised.

Currently, most health actors rely on estimations provided by UN-led surveys for population size and needs. This includes the Humanitarian Needs Overview (HNO), which is an annual exercise led by the UN-OCHA and is aimed at estimating population size and needs. The HNO relies mainly on self-reporting by humanitarian actors. The other source is the Humanitarian Needs Assessment Programme (HNAP), which is a joint UN assessment initiative that tracks displacement and return movements. It conducts multi-sectoral assessments, and monitors humanitarian needs inside Syria. HNAP is implemented through local Syrian NGOs, with technical support from UN Agencies. It employs community-based surveys as a methodology to estimate population size, population movements, and humanitarian needs. Additionally, these sources rely on estimations provided by different local authorities, including the GoS. However, discrepancies and variations between these estimations and those provided by other local entities, such as local councils in each governorate, are critical.

Nevertheless, there are still some basic alternative sources of information that can be utilized to estimate population size and composition. These include data generated by the humanitarian health response, such as vaccination data, Middle Upper Arm Circumference (MUAC) screening data and morbidity reports. For example, MUAC screening data is available in certain areas for all children aged five and under, due to mass screening initiatives conducted by some NGOs. This data can be used to estimate the number of under five children, which can then be extrapolated to generate estimations for the whole population using expected age structures. We found this to be one of the missed opportunities for health actors to validate the data provided by the surveys based estimates.

3.6.2. Information about public health risk factors

Public health risk factors include all issues that could have an adverse impact on health outcomes. The key risk factors that were identified as part of the minimal set of health information that should be available in conflict settings include (1) Exposure to armed attacks, (2) Sexual and gender-based violence, (3) Food security and feeding practices, and (4) Nutritional status. We assessed the availability of each one of this information in the NES context.

- **Exposure to armed attacks**

Exposure to armed attacks was found to be among the most available data in the NES. Health actors rely on various local and international databases and sources of information to be informed about recent safety and security related incidents that might affect their work. Some of the most cited databases and sources we identified for exposure to armed attacks in the NES are the International NGO Safety Organisation (INSO)[4], LiveUAmap[5], the Wartime and Post Conflict in Syria project of the Center for Operational Analysis

[4] https://ngosafety.org/
[5] https://syria.liveuamap.com/

and Research[6], local media agencies such as Hawar news[7] (a news agency based in Brussels and specialised in news related to Kurds especially in the Ronjava area), Baladi news[8] (a local news agency that covers all areas of control in Syria). NGOs rely also on their internal safety and security analysis, with almost all of our NGOs informants reported having a dedicated department for safety and security.

For Attacks on healthcare, all international health actors and most of the local ones were found to be aware of the WHO led Surveillance System for Attacks (SSA)[9]. However, many NGOs reported that the HWG mediate the reporting to the SSA instead of having a direct connection from the NGOs to the Whole of Syria Health Cluster in Amman, which is the entity currently managing the SSA system. The SSA uses self-reporting by NGOs and health facilities for attacks and injuries, and the system has various forms of reporting, such as a user-friendly mobile application. Despite this, the mobile application is not in use in the NES, and the system suffers from critical gaps that limit its usability and trust among local health actors, as reported in Syria (17) and Ethiopia (18).

- **Sexual and gender-based violence (SGBV)**

We found that 100% of the health actors we interviewed have reporting systems in place for SGBV cases. The utilisation of these systems, however, might be limited due to cultural barriers in some areas in Ar Raqqa and Deir ez Zour governorates. Additionally, these internal reporting systems are not combined in a national level database and are not linked to any sort of local communication channels with local authorities or local communities.

The role of the United National Population Fund (UNFPA), which is the United Nations sexual and reproductive health agency, was found to be almost absent in the NES. Being based in Damascus is limiting any role that could be played by the UNFPA in the NES. Some International NGOs in the NES should scale up their SGBV programming to cover the gap.

- **Food security and nutritional status**

Data on food security in the NES is available through market assessments, community based surveys, and feeding practices surveys. These assessments and surveys are usually conducted by NGOs that work in the sectors of food security and livelihood. Only some of these reports are accessible publicly. The frequency of these report also seems to be ad-hoc and follow only operational or donors reporting requirements. Local authorities do not seem to have accurate data on agriculture production or household livelihoods. These two areas could be filled by household surveys or community focus groups to make this information available.

The availability of data on nutritional status for children under five was found to be significantly more comprehensive than that of general food security data, likely due to the regular MUAC screening and nutrition programming administered by NGOs. Almost all health NGOs in the NES do conduct MUAC screening either through their routine health services or through dedicated community based screening.

[6] https://coar-global.org/wpcs-2/
[7] https://www.hawarnews.com/ar/
[8] https://www.baladi-news.com/ar
[9] https://extranet.who.int/ssa/Index.aspx

Health actors do also use other anthropometric measurements, such as height, weight, head circumference, Body Mass Index (BMI). The use of Z score (Weight/Hight score), which compares a child's weight to the weight of a child of the same length/height and sex to classify, however, is limited. This in turn means that data on Moderate Acute Malnutrition (MAM), defined as a z-score between -2 and -3, and Severe Acute Malnutrition (SAM), defined as a z-score of <-3, is also limited. Analysis of existing data is also limited.

3.6.3. Information about public health services

- **Service availability and functionality**

Considering the absence of a national entity that manage health information in the NES, the HWG plays a central role in health information management and dissemination, especially in relation to service availability, functionality and coverage. The HWG does this through three main data tools: the 4Ws (What, where, who, when) database, the mapping tool for health facilities, and the HWG monthly bulletin. However, all of these tools rely on self reporting by NGOs, which raises questions on data completeness, accuracy, and reliability. On the positive side, the HWG uses indirect channels to communicate the key findings of this data with the local health authorities to inform their planning and implementation. Another good practice that was identified is that some NGOs, such as Relief International, sign Memorandum of Understanding (MOU) with the local health committee of the location where the health facility is based. As part of this MOU, RI shares monthly updates on services availability and functionality as well as some data on health outcomes with the local health committees. This is essential to involve local communities in health planning, implementation, and sustainability of services.

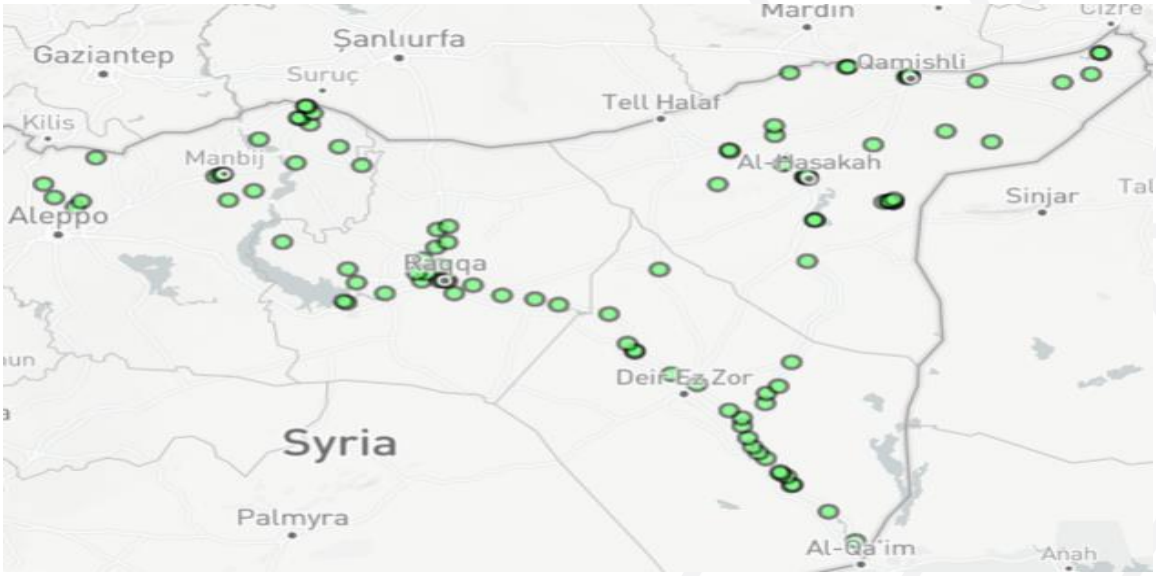
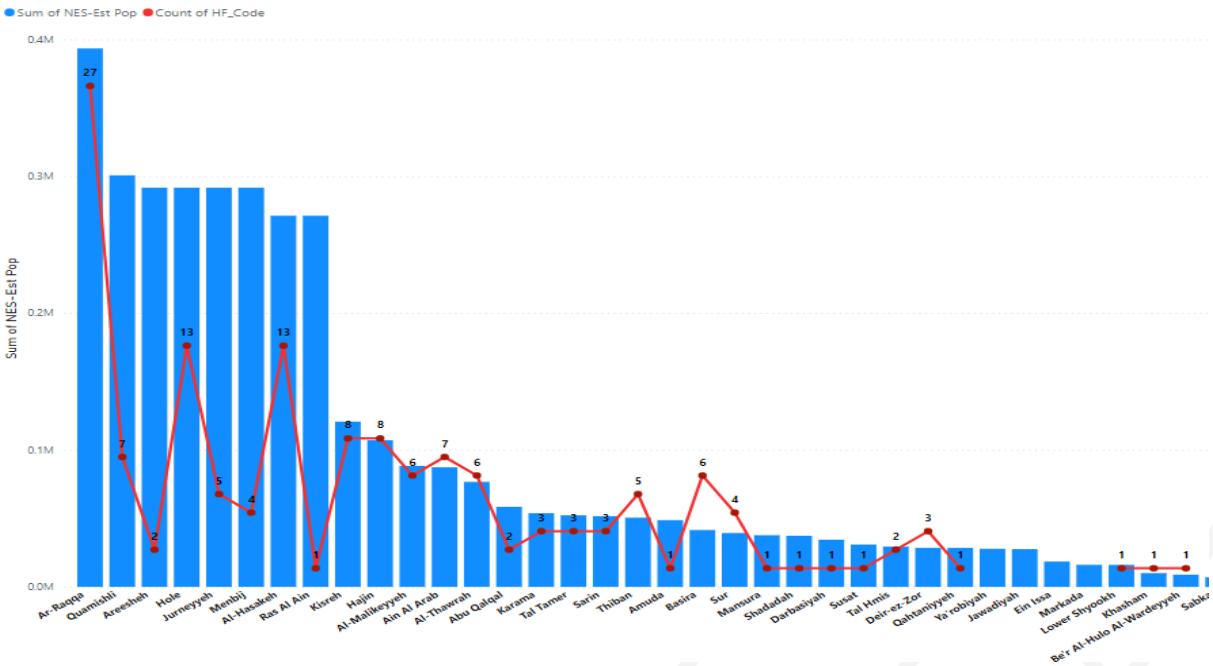


FIGURE 4 DISTRIBUTION OF HFS IN THE NES AS PER THE 4WS REPORTING - SOURCE: HWG - OCT 2022

As per the HWG's mapping tool for health facilities in the NES, there is a total of 147 health facilities in the NES as of October 2022. This number includes both NGOs run and DoH supported facilities. The mapping tool also links the number of health facilities to the estimated number of populations in each sub-district in the NES. This helps in health planning to better allocate health resources based on gaps in coverage.



Another tool is the Health Resources Availability Mapping System (HeRAMS), which is a routine exercise that should be conducted on quarterly basis in humanitarian crises led by the WHO and the health cluster. This exercise, however, is very limited in the NES. We found considerable discrepancies between the reported numbers of health facilities in the recent HERAMS report (HERAMS – 2021)(6), which is compiled by the Whole of Syria Health Cluster, and the numbers from the HWG and the numbers from the DoH – SANES. These discrepancies can be attributed to the very limited presence of the WHO in the NES as a leading agency for the HERAMS exercise. None of the interviewed NGOs stated a direct reporting to the HERAMS in the NES.

- **Service Coverage**

Data on coverage of health services is very limited in the NES. While the 4Ws gives an estimation for the distribution of the locations of health services, there is no information on the actual coverage of these services. For example, we do not know where women are coming from to access certain RMNCH services in Al Hol maternity hospital. Similarly, we do not know the coverage of certain services, such as vaccination, family planning, and nutrition interventions. This can be rectified through incorporating coverage outcomes within NGOs Routine Health Information Systems, and through coverage surveys for specific services (for example vaccination coverage surveys). This is crucial for the formulation of health policy and the provision of services to enable equitable access to health services on the one hand, and to identify key deficiencies in services on the other.

- **Service quality and effectiveness**

Another key gap in this domain is data on service quality and effectiveness. We found no datasets or an agreed set of indicators related to health services quality on the NES level. While individual NGOs do have various data systems and M&E mechanisms to monitor and report service quality, these systems are

designed mostly for reporting purposes with limited clinical and health focus. The availability of such data depends on the reliability of the RHIS used in each facility/NGO. Some systems do collect data on detailed health outcomes and allow for trends analysis of morbidities to identify gaps in quality. However, such systems are the exception in the NES, as most health actors use limited paper based RHIS. Additionally, data on quality of services is only internal and is not shared externally.

The HWG has recently developed a tool for Infection Protection and Control (IPC) assessment in health facilities. Such data tools that target specific element of service quality can be expanded to cover some of the gaps in this type of data.

3.6.4. Information about public health outcomes and impacts

- **Communicable diseases and public health emergencies**

Data on communicable diseases, especially those that could cause outbreaks and pandemics, is relatively available in the NES. There are three currently three surveillance systems for notifiable communicable diseases:

A. The Early Warning and Response Network (EWARN)[10]: this surveillance is run by the Assistance Coordination Unit (ACU), which is an NGO based in Gaziantep/Turkey. The EWARN was established in June 2013 by the ACU. It is a health information system for surveillance and monitoring epidemiological diseases. The platform provides data on 14 different communicable, including Acute Bloody and Watery Diarrhea, Acute Flaccid Paralysis, Acute Jaundice Syndrome, and Measles. EWARN uses the reporting forms, case definitions, and alert thresholds from the World Health Organization's (WHO) field manual. Along with the weekly bulletins, EWARN issues a weekly surveillance of some notifiable diseases such as acute flaccid paralysis and water-borne diseases. Almost all of the EWARN reports are available publicly online via their website. The WHO, UNICEF, and the CDC are all involved in providing technical support for this program, with EWARN being the main approved source of health data for northwest Syria by the WHO and UNICEF.
   The geographical coverage of the EWARN in the NES is quite comprehensive and cover almost all of the non-GoS controlled areas in Ar Raqqa and Deir ez Zour governorates.
B. The Early Warning and Response System (EWARS): this surveillance is run by the GoS – MOH in Damascus. It was established in 2013 by the WHO in response to the various public health threats caused by the Syrian conflict. The EWARS was planned to cover not only Syria, but also Syrian refugees in neighbouring countries (19). The EWARS has almost the same design of the EWARN in relation to notifiable disease, forms and data flow. The EWARN system, however, was found to be more effective in relation to timeliness of reports and completeness of data (20). The geographical coverage of the EWARS in the NES is questionable. The MOH of the GoS claims the EWARS covers all of the NES, while in practice the coverage is limited to the Qamishli National Hospital and some other limited MOH supported health facilities.

[10] https://acu-sy.org/ewarn/

C. The Kurdish Red Crescent Surveillance system: this system was developed during the COVID-19 outbreak in light of the limitations of both of the EWARN and the EWARS systems. The KRC surveillance is active in all DOH supported health facilities and in community based settings. Despite having only limited diseases being actively tracked such as COVID-19, Cholera, and Hepatitis B, the scope of diseases monitored may expand depending on the availability of resources and the emergence of new public health threats.

Recently, and in the wake of the Cholera outbreak in Kurdistan Iraq region, the HWG developed a reporting tool for waterborne diseases. The tool was put into practice in August 2022 just before the Cholera outbreak that hit the region in October.

- **NCDs and mental health**

The prevalence of Non-Communicable Diseases (NCDs) in the NES is a critical area of knowledge deficiency. There is no information regarding the prevalence of key NCD morbidities such as diabetes and cardiovascular diseases. Similarly, there is no standard reporting system in place for mental health morbidities with high impact on communities, such as suicidal thoughts and bipolar depression, despite reports by NGOs indicating high prevalence.

To address these gaps, some NGOs have initiated the establishment of case trackers for NCD cases. For example, all health facilities under the HERNES project have a case tracker for NCDs to ensure that their patients receive regular follow-up and uninterrupted treatment.

- **Population mortality**

The lack of mortality reporting in the NES region poses a critical gap in health information. Neither facility-based mortality nor community-based deaths are adequately reported. In order to update their civil records in Damascus, community members register deaths in the GoS-run central registry in Al Hasakeh and Qamishli. As detailed in Section 3.6.1, however, no local authority or entity in the NES has access to this data stored in the central civil registry in Damascus. Interviews with various NGOs revealed an absence of systems to identify the causes of death, with the exception of medical notes issued by local doctors to be used by community members in registering deaths in the central registry.

3.6.5. Summary of public health information in the NES and possible actions

We found critical gaps in public health information in the NES, especially in the areas of population size and composition, health risk factors (such as food security and livelihood), health service (such as coverage of services, and quality of services), and health outcomes (especially NCDs, mental health, and mortality).

The following table summarises the available information for the key health information domains in the NES:

TABLE 3 AVAILABLE DATA ON THE MAIN HEALTH INFORMATION DOMAINS IN THE NES

Domain	Available information	Methods used	Agency
	HNO	Self-reporting by humanitarian actors	UN-OCHA

Population size and composition	HNAP	Community based household surveys	Multiple Syrian NGOs and UN agencies
	Population dashboards	Ad-hoc surveys, informal comms.	RAECH initiative
	Programmatic data	Nutrition screening, RMNCH services	MSF, Save Children, Mehad, other NGOs
Exposure to armed attacks	Security incidents data	Incident reporting, field focal points	INSO
	SSA database	Facility based surveillance	WHO
	LiveUAmap – Syria	Social media	LiveUAmap
	WPCS weekly reports	Social media, conflict analysis.	COAR Syria
	Security analysis	Incidents reporting + security analysis	Most NGOs
SGBV	Internal databases	Facility based surveillance of SGBV cases	Most NGOs with little role for UNFPA
Food Security	Multiple ad-hoc reports	Household surveys – Market analysis	Self reporting
Nutritional status	MUAC Screening	Facility based and community based screening	MSF, Save Children, Mehad, other NGOs
	Malnutrition case tracker	MAM and SAM programming	MSF, IRC, Save Children
Service Availability	HERMAS	Self reporting (limited)	WHO (Whole of Syria)
	4Ws	Self reporting	HWG
	Facility mapping	Self reporting	HWG
Service coverage	Limited programming data		
Service Quality	M&E reports	Facility based field visits + exit interviews	Self reporting
	RHIS data	Programmatic data	Self reporting
CDs	EWARN	Facility based surveillance + field focal points	ACU
	EWARS	Facility based surveillance	MOH
	KRC surveillance	Facility based surveillance + field focal points	KRC – DOH
	Water born CDs dashboard	Self reporting	HWG
NCDs	Programmatic data	RHIS	Multiple NGOs
	NCDs tracker	RHIS + case tracker	Mehad
Mental Health	Mental health case trackers	Limited programming data (MPHSS + mhGAP)	Multiple NGOs
Mortality	NA	NA	NA

We gave scores from 0 to 4 for each set of health information of these four domains. The score depends on the number and the quality of available databases and sources of information for each category. The following diagram summarises the scoring of the main public health information domains in the NES. The

colour scheme gives red for the least available information (score=0) and green for the most available information (score=4).

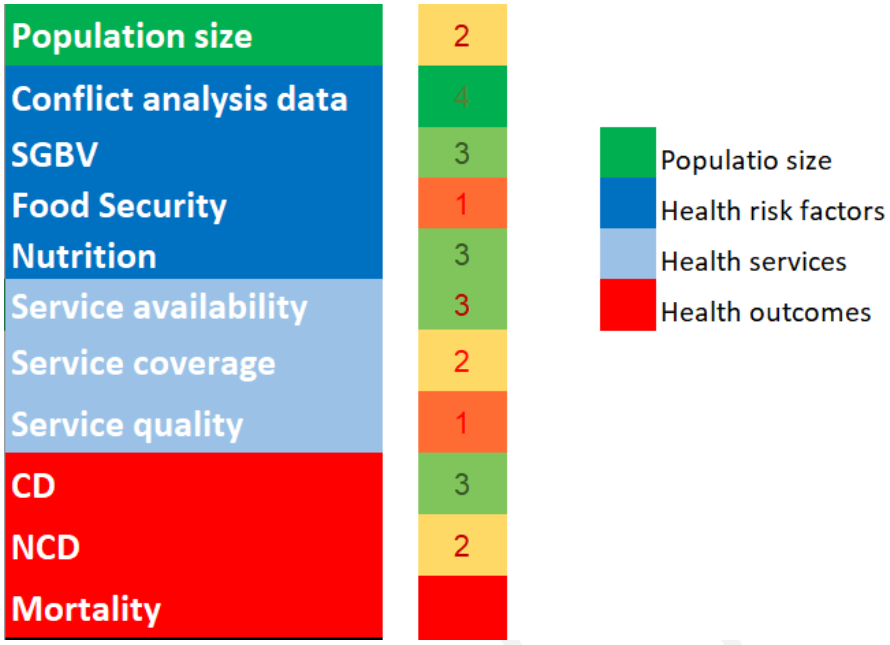


FIGURE 5 AVAILABILITY AND QUALITY OF THE MAIN HEALTH INFORMATION DOMAINS IN THE NES

In the absence of a national central body to manage health information in the NES, the HWG has become the central mechanism for data management and dissemination. To improve the availability and quality of health information, the HWG requires increased technical support to strengthen the central mechanisms for data management, analysis, presentation, and dissemination. The HWG should work on building local capacities to sustain this function.

Critical gaps in health data that humanitarian actors can help to fill include population size data, non-communicable diseases (NCD), service coverage, and service quality. This can be done through:

- Better utilisation of programmatic data, such as nutrition screening or RHIS data, to be used in estimating population size and composition.
- A central reporting mechanism for key NCD and mental health cases can feasibly emerge from the individual RHIS systems of NGOs. This will help in estimating prevalence and risk factors for key NCDs and mental health disorders.
- An agreed set of indicators for quality of health services can help NGOs standardise a minimum level of quality of services that is tracked on the HWG level.

Mortality reporting is another area that should be addressed in order to capture data on facility-based deaths. All health facilities should have the ability to diagnose cause of death and issue the appropriate forms/reports. Finally, collaboration with other sectors is needed to complement data on health determinants, such as food security and water, sanitation, and hygiene (WASH).

3.7. Routine Health Information Systems (RHIS) in the NES

We used the HIS assessment tool that was developed by the MEASURE Evaluation project, which is a consortium of six different organisations specialised in health system strengthening led by the University of North Carolina at Chapel Hill and funded by the USAID. The project was launched in 1998 to strengthen HIS in low income countries. The rapid assessment tool we used for RHIS assessment in the NES was developed in 2018 and is allied with the "Monitoring and Evaluation Assessment and Planning Tool," developed by WHO. Please see annex A for the detailed questions.

The assessment tool has a total of 97 quantified questions distributed into four main domains, each containing a variety of elements as follows – (the numbers between brackets indicate the number of questions for each element):

- Management and governance: Human resources (7), management (12), policies and planning (9).
- Data and decision making: Data needs and levels (21), standards and system design (7).
- Data collection and processing: Collection, management, and reporting of individual data (5), collection, management, and reporting of facility data (5), data quality assurance (8), information and technology (5).
- Data Analysis, dissemination, and use: data analysis (6), information dissemination (5), data demand and use (7).

These domains and elements are meant to be assessed on both national level and health providers (NGOs in the case of the NES) level. However, because of the absence of a national central body for health information, we did not conduct a full assessment for the national level RHIS. We included only some questions to assess this level in our KIIs.

Based on our interviews and desk review, we identified an absence of any comprehensive RHIS system at the national level, which included any form of paper-based or basic RHIS. All routine health information available was gathered informally through individual communication and ad-hoc self-reporting, that lacked a clear data flow. In response, the Department of Health (DOH) has recently established a new office for statistics; however, this office lacks the necessary resources in terms of personnel, technical and financial capacities. Furthermore, the lack of infrastructure and technology related to health information, both at the DOH's central level and its facilities, present pressing obstacles for the implementation of a national RHIS.

On health providers level, we conducted a total of 7 questionnaires for RHIS systems that are used by eight different NGOs. These NGOs are: Action For Humanity, Cadus, International Rescue Committee (IRC), MDM, Medical Relief For Syria (MRFS), Relief International (RI), and Mehad (UOSSM France formerly). There were some variations between the different NGOs in relation to the assessed domains and elements, but we present here an average of the scores. It is important to mention that these findings might be positively biased because we selected only NGOs that do have reliable RHIS to be included in the assessment. These findings, therefore, should not be generalised to all health providers in the NES; the findings rather should be treated as a baseline for the current functioning RHIS systems in the region.

3.7.1. RHIS – Management and Governance

- **Policies and planning**

Only 14% of the respondents confirmed they have adequate policies for facility based information, whereas 57% said they do have policies but these policies might be out of date or not practical. Identifying roles and responsibilities for decision making related to health information was one of the identified actions to improve these policies. One area of strengths that was identified in the current policies is data privacy and confidentiality. 71% of the reviewed RHIS systems do have policies that include mechanisms to ensure privacy and confidentiality of personal information. None of the reviewed NGOs has costed plans for RHIS improvements. 57% do have plans but these plans are not costed.

- **Management**

86% of the reviewed NGOs have detailed Standards Operating Procedures (SOPs) for RHIS management, data flow, and data collection. 50% of these SOPs, however, were found to require a lot of strengthening, especially in relation to identifying roles and responsibilities across the various levels of human resources.

All of the reviewed NGOs were found to have commitment from their leadership to the development of RHIS and information management generally. 71% of the senior leadership teams do provide systematic feedback on the development of information systems. This feedback, however, do not reach all levels of data and human resources except for 14% of NGOs. Supervision was another area of strengths for the reviewed RHIS with about 86% of the reviewed RHIS has systems for supervisions and mentorship. All of the reviewed RHIS have master lists for the covered health facilities with adequate data flow charts.

- **Human Resources**

Required staffing positions for the RHIS and their respective knowledge, skills, and competencies are identified in all of the reviewed systems in the NES. There are also workforce development plans for these human resources. 71% of these plans however require a lot of strengthening. Only 43% of the reviewed systems did carry out workforce assessments to map existing cadres to the required job positions and to identify gaps in positions and capacities. Only one of the reviewed systems has a costed capacity development plan for staff involved in RHIS. 57% of the NGOs maintain a database on training to track which cadres have received which training, when, and where to help identify the training needs of institutions and individuals.

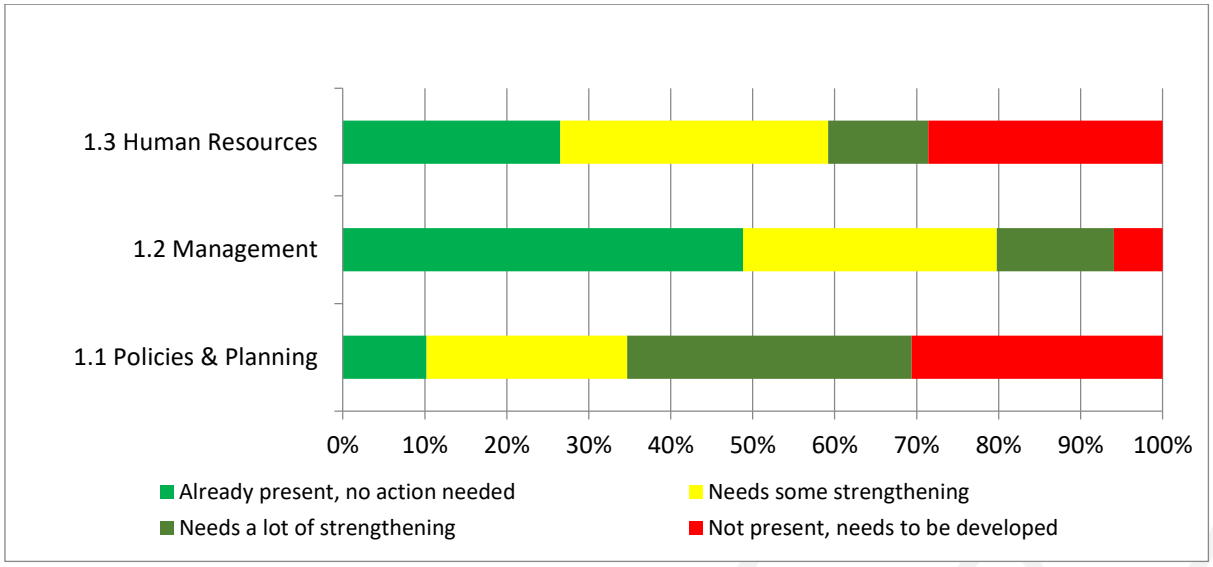


FIGURE 6 RHIS MANAGEMENT AND GOVERNANCE

3.7.2. RHIS – Data Needs

- **Core Indicators**

All of the reviewed RHIS has an agreed set of indicators for a balanced and limited set of facility-based data with standard definitions and appropriate disaggregation (for example, age, gender). 29% of these indicators require strengthening in relation to case definitions. While 71% of these indicators have programmatic targets mostly based on donors, only 14% of the indicators have baselines. This limits the ability of health actors to identify their contributions to health system capacities and develop improvement plans accordingly. 57% of the indicators are aligned with global standards in relation definitions, data sources, data collection methods, and reporting frequency.

- **Facility based mortality**

None of the RHIS systems have adequate mortality reporting features. Causes of deaths are not properly collected and reported. Only 14% of the RHIS systems have forms for the cause of death with the required knowledge and skills among the certified physicians to complete these forms.

- **Community based data**

All of the RHIS systems have a minimum set of community-based indicators (with standard definitions, and appropriate disaggregation and frequency of collection) to monitor the implementation of community-based interventions. Only 57% of these systems, however, have appropriate links between the mostly paper based information systems for community based interventions and the electronic records for the facility based information. Another key gap is the lack of outreach assessments and surveys to understand coverage and information gaps/opportunities at the community level.

- **Surveillance**

Surveillance for key communicable diseases is one of the main strengths of the reviewed RHIS systems. All systems have list of priority diseases and syndromes with standard case definitions and an active case detection and reporting. 86% of the RHIS systems produce weekly reports with over 80% of these reports are complete and timely. Data in these weekly reports are analysed in about 71% of cases and the appropriate actions/alerts are taken/issued.

- **Standards and system design**

86% of the reviewed systems use international or national classifications for categorizing aggregated data/ For example the International Classification for Diseases (ICD-10), the Essential Health Service Package (EHSP), and classification of facilities and human resources.

Only 57% of the systems have an integrated common data repository (for example, a data warehouse) for all facility-based data that can grow and adapt to changes and new requirements. This is translated into a facility based archiving system archive the paper based patients records and an electronic repository (or online server) to archive the electronic medical records. Even in the absence of a dedicated data repository, almost all systems have adequate facility-based metadata available to facilitate interoperability of electronic information systems.

An area for development that was identified is the involvement of end users (mostly patients) and community members in the design of the facility based and community based information systems.

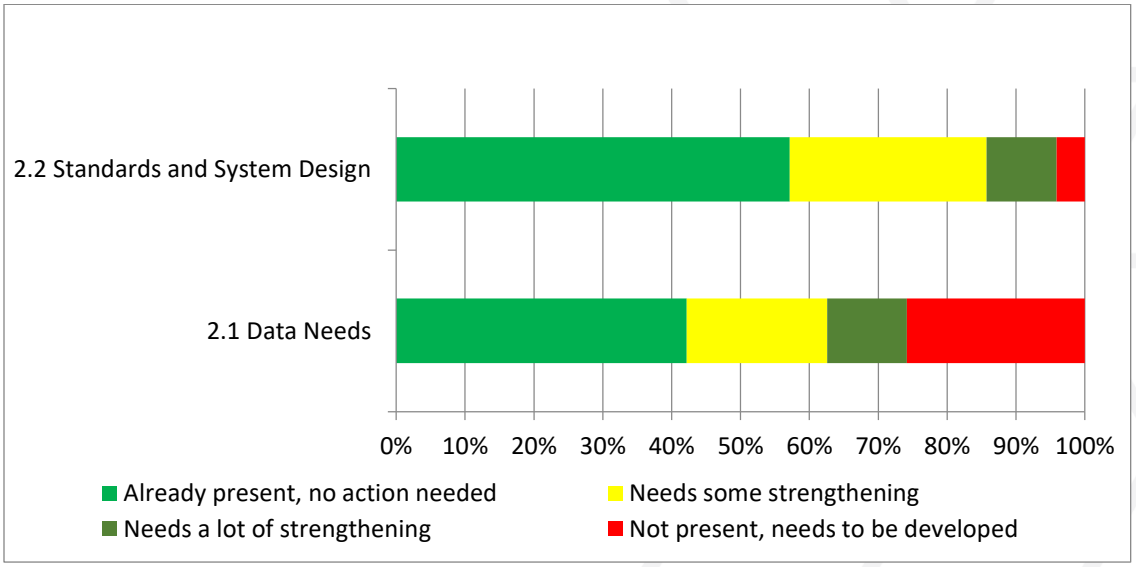


FIGURE 7 RHIS DATA DESIGN AND DECISION SUPPORT NEEDS

3.7.3. Data Collection and Processing

- **Collection and Management of Individual Client Data**

All of the reviewed systems have data collection systems for client data (for example, clinical visits) and those systems are standardized across all implementing facilities. Only 43% of the staffing involved in data collection are adequately trained in the collection of client data and how to input the data in the system database. The other 67% of the staffing are only partially trained. Only 14% of the facilities implementing the reviewed RHIS systems have printed guidelines to assist with client-level data collection. And lastly, 57% of the RHIS systems have schedules/plans for the update, reproduction, and distribution of data collection tools.

- **Collection and Management of Aggregate Facility Data**

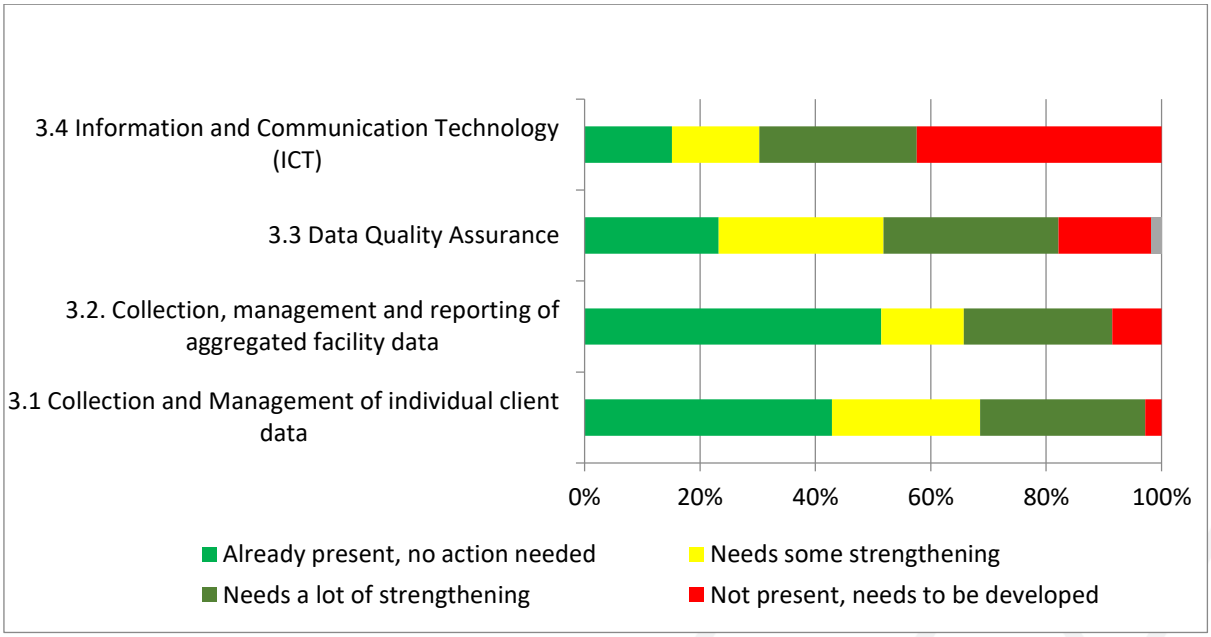
43% of the RHIS systems have clearly defined data flow patterns (that is, data flow from client encounter forms to summary tools [for example, a register or tally sheet] to a periodic aggregate reporting form). 57% of the relevant staff have received training on data compilation and reporting. Almost all systems maintain data disaggregation by key stratifiers (age, sex, geography) during their compilation and transfer to permit equity analysis. Data transfer to the next level occurs in a timely way in 100% of the reviewed systems, making use of innovation and information technology (IT) where appropriate and available.

- **Data Quality Assurance**

While 71% of the reviewed systems do have regular data quality checks, limited efforts are paid towards clarifying roles and responsibilities in relation to data quality. Additionally, there is no collaboration with the local health authorities, or other stakeholders in the field, on data quality assurance so that assessments are conducted with an element of independence.

- **Information and Communication Technology (ICT)**

Surprisingly, we found a good use of ICT in the development of the RHIS systems. All of the reviewed systems rely on various software and information technology, such as SQL server and mobile applications (we will discuss the technical design of some of the systems in section 3.8). However, there is limited utilisation of ICT in the implementation phase, which could be a missed opportunity. 43% of the systems use electronic methods for data quality checking prior to data transfer. Almost none of the reviewed systems make routine microdata available (that is, a subset of data from the RHIS are selected according to specific criteria) to researchers and analysts from other government agencies, donors, and the private sector (with appropriate safeguards for confidentiality, for example, stripping the dataset of identifiers).



3.7.4. Data Analysis, Dissemination, and Use

- **Data Analysis**

While data collection was found to be well developed in most of the reviewed systems as presented in the previous section, data analysis was found to suffer from some gaps. Only 29% of the reviewed systems have defined principles for data cleaning/analysis, including how to deal with incompleteness, inconsistency, implausibility, estimation of denominators, imputation of missing values, and data reconciliation across data sources. Tools used for data analysis, such as summary tables, graphs, geographic information system, pivot tables, decision support systems, etc., are only partially available in 71% of the reviewed systems.

Health planners and development partners rarely use the results of the analysis of facility data to produce analytical reports on progress and performance for the health sector review. There are no collaborative mechanisms established with local research and academic institutions to conduct analytical reviews of facility data on a periodic basis.

- **Information dissemination**

Dashboards and summary charts are used in all of the reviewed systems to convey information to diverse target audiences. All of the reviewed systems use Power BI software to present dashboards for facility based data. However, this dissemination is mostly internal only with very little collaboration with other actors. The HWG and the local health authorities are rarely engaged in relation to developing strategies for RHIS data dissemination. Some NGOs, such as RI, do share some of their RHIS data on regular basis with the relevant local health committee according to pre-signed MOUs.

- **Data Demand and Use**

Our informants agree that there is a need for policy leaders and decision-makers to promote a culture of information use. This could be initiated by the HWG and some of the leading health actors to start collaboratively using facility and community-based data in planning, monitoring, and evaluation reports. Only 33% of clinicians in the facilities where the reviewed RHIS systems are implemented do use clinical data from the RHIS systems routinely to monitor patient care and outcomes.

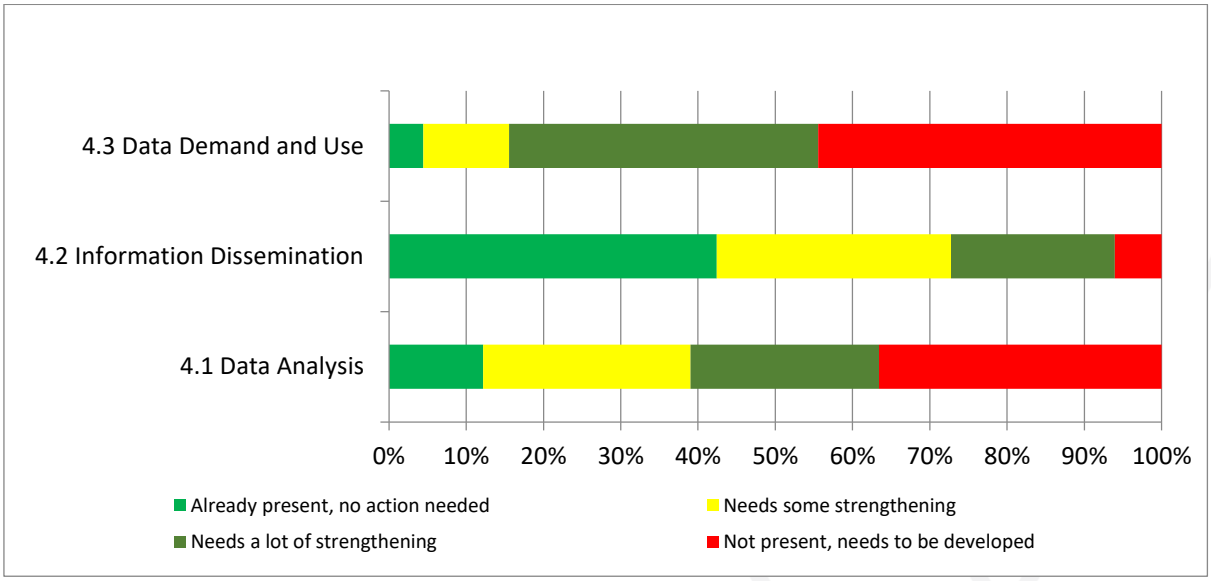


FIGURE 8 RHIS DATA ANALYSIS, DISSEMINATION, AND USE

3.8. Technical design of some of the electronic RHIS

At least 5 large NGOs in the NES are using electronic HIS in their supported facilities, which collectively constitutes around 40% of health facilities in the region. We tried to identify various similarities in these systems to explore future integration possibilities.

	Mehad	RI	IRC
launched	2020	2019	2019
Software and programming	SQL server – Visual Studio	MS Access (BVA language)	MS Access + CommCare for some services (MH, NUT, IPC)
Paper based	All systems use patients' registries to back up the electronic records. Both systems are linked through patients' identifiers.		
Data flows	All systems use similar data flows from patient forms to summary tools (such as tally sheets) to a periodic aggregate reporting form.		

Data entry interactions	Software in Arabic and English	Arabic and English forms	MS Access (English only)
Data retrieving	Using ID + other different variables (such as name, residency status, age, gender) the system can retrieve records in case of revisits.		
Paper Data repository	Paper records are stored and archived inside the facility.		
E – data repository	SQL server	Online cloud	Online cloud
Morbidities tracked	>100 morbidities with case definitions	>600 morbidities with case definitions	>100 morbidities
Prescriptions tracking	No	Yes. >600 drugs	No
Data transfer	Online/offline		
Data dissemination	Power BI – Dashboards – weekly and monthly reports – reports to the HWG as per the reporting requirements - Reports are shared with partners and donors		
		Monthly reports to the local health committees	

The below screenshots are provided to illustrate some of the features of the aforementioned RHIS systems.

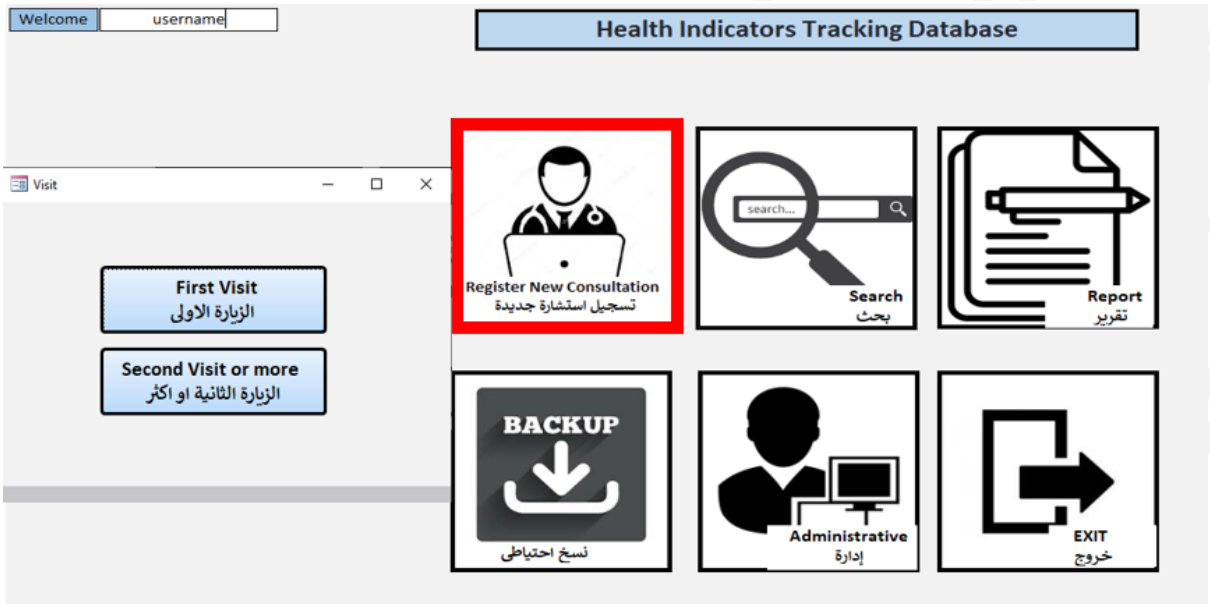


FIGURE 9 RI'S RHIS DATA ENTRY INTERFACE

FIGURE 10 MEHAD'S RHIS DATA ENTRY INTERFACE

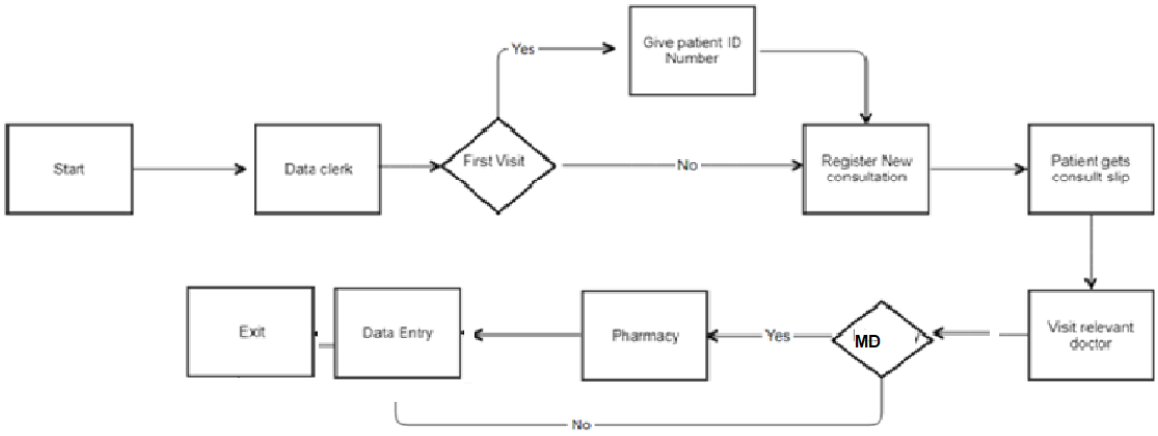


FIGURE 11 RI'S RHIS DATA FLOW CHART

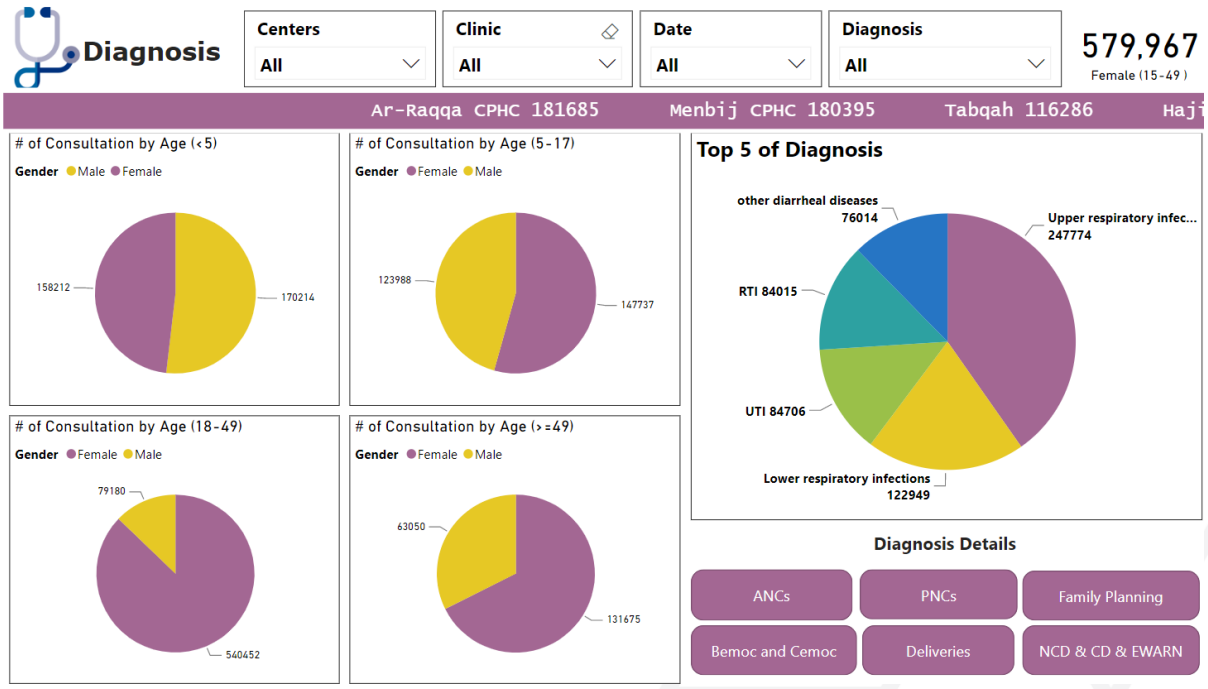


FIGURE 12 MEHAD'S RHIS - POWER BI DASHBOARD

3.9. A road map for Routine HIS in the NES

Building upon the research findings on the current status of health information in the NES, a workshop was convened in Erbil on 6 October 2022 to assess how to improve health information management learning from the existing best practices and trying to overcome key gaps and challenges. During the workshop, we conducted group work to discuss possible scenarios for the future of health information in the NES. The outcomes of the group work were crucial recommendations that were categorised into two phases: transitional, and long-term phases.

3.9.1. Transitional phase for HIS in the NES

The transition phase to develop health information management and practices in the NES should be focused on bridging the gap between the current status of health information and a long term vision of a locally led decentralised system for health information management with a central coordination and a national stewardship. This can be done through learning from the current best practices, some of which are detailed in the abovementioned sections, increasing the harmonisation between the various existing systems, and building the local capacities.

The transition phase should begin with the (**1) establishing a dedicated sub working group for health information management** at the HWG level. This group will have members of health information specialists from all health actors in the region. The main aim of the group will be to further understand the current status of health information management and practices in the NES and govern the relevant national planning and implementation.

The health information sub working group should work on **(2) developing a set of health indicators**. This set can be built based on the existing efforts related to the Essential Health Service Package at Primary and Secondary health care levels. The EHSPs include sets of interventions that can be linked to sets of health indicators at each level of care. These indicators can be harmonised into a master list of health indicators and an expectation that all partners report regularly accordingly. The development of this set should also utilise the WHO's Global Reference List of 100 Core Health Indicators that was developed in 2018 (21). This reference list links each health indicators with its relevant Sustainable Development Goal (SDG), which could contribute to paving the way for the development phase of the health system in the NES. The indicators should cover at least four distinct areas: health status (which includes health outcomes), health risk factors, service coverage, and health system indicators. This should be coupled with the development of case definitions according to the International Classification of Diseases 10th Revision (ICD-10) and other relevant standards.

This can be followed by **(3) the development of national policies and guidelines for RHIS** including specific protocols for data collection, data confidentiality and privacy, and information sharing and dissemination. These policies and protocols should utilise the existing guidelines of leading health actors in the region, and build on these guidelines to have a customised version that fits the local context in the NES.

Finally, the group is encouraged to build **(4) new dashboards for sharing data of the agreed set of indicators**. This will make more information available on key morbidities and health outcomes, health services and coverage, health risk factors, and health system performance to inform related practices across the various health actors in the region. The development of these dashboards should be in line with clear information sharing and dissemination protocols.

3.9.2. Long term phase for HIS in the NES

The goal of this long-term phase should be to create a comprehensive and integrated health information system that would allow for the reliable and timely collection, storage, retrieval, analysis, interpretation, and dissemination of health data. This would provide the basis for evidence-based decision-making and the development of effective health policies and planning in the region. The implementation of these measures would create a data-driven environment where health professionals and policy makers are better informed, better able to respond to health issues, and ultimately, better able to improve the health outcomes of the population in the NES.

In order to coordinate and harmonise the use of health information to inform health policy and planning, the following long term phase should be implemented. The implementation of this phase could be led jointly by the abovementioned health information sub working group and the relevant health information departments at the central health authority in the NES. The following steps are proposed based on the current status of health information in the NES, which should be revised during the transitional phase of the road map.

Firstly, technical staff from local health authorities could be invited to be involved in the sub working group for health information. This working group could be moved to be under the Health System Strengthening working group, that has already been established in November 2022. **Secondly, capacity building plans** for local staff and for the DOH statistics office staff in relation to health information

management can be developed. NGOs and other health actors can be invited to be part of the development as well as the implementation and the delivery of these plans. Thirdly, based on their developed capacities, the **local health authorities could be involved in health information planning** and information sharing. The health information working group should develop strategies for such involvements on various levels, including community health entities, regional health committees, and the central DoH.

After ensuring local engagement and ownership, the efforts then could be fourthly focused on **harmonising existing health information systems** and software across the different health actors. A unified reporting system such as the DHIS2 should be implemented at least for facility aggregated data. This will ensure that even if the different health actors use different systems for data collection of individual data, there will at least a harmonised approach for reporting facility-based data. **Fifthly, the implementation of the DHIS2 or other agreed software could be expanded** to cover all the NES region. The use of DHIS-2 (or other agreed software) should be mandated for data collection for individual and facility aggregated data and for data reporting in all public facilities. Private facilities can continue to use their own systems for data collection, but they should be also mandated to use the same unified system to report facility aggregated data. The private sector can be incentivised to use the unified agreed software even for data collection through packages of trainings and technical support.

Sixthly, the local ownership of the regional and central health information systems could be gradually shifted to the relevant local health authorities. This will ensure sustainability as well as enforcement of the developed plans and systems. Finally, on the long term, ways **to harmonise approaches** of health information management between the NES and the other areas of control in Syria could be explored.

Therefore, this long term phase for the road map to develop health information management and practices in the NES should be implemented in order to coordinate and harmonise the use of health information to inform health policy and planning. Harmonising existing health information systems and software, involving the local health authorities in health information planning and information sharing, expanding the implementation of the DHIS2 or other software, gradually shifting the ownership of the regional and central health information systems to the local health authorities, and exploring ways to harmonise approaches of health information management between the NES and the other areas of control in Syria are all key components to achieving this goal. The implementation of these steps will ensure that the road map to develop health information management and practices in the NES is successful and will ultimately lead to better informed health policy and planning.

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Annex A – Topic guide for the Medical Education KIIs

Questions / information
Name of organisation/ governmental authority اسم المنظمة أو الجهة الحكومية او الإدارية
سنة التأسيس year of establishment
What is the stakeholder's **historical** role prior to the start of the Syrian conflict? ما هو الدور أو مجال العمل الأصلي قبل بداية النزاع في سوريا
What is the stakeholder's **current** role in the NES health education system's context? ما هو الدور الحالي في شمال شرق سورية في سياق التعليم والتدريب الطبي
What is the stakeholder's **area of expertise** (e.g. medical, nursing, midwifery)? ما هو مجال خبرة وعمل الجهة (أطباء-تمريض-قبالة إلخ
What **intervention**/s is/are the stakeholder currently working on in the NES health education system? ما هي البرامج التدريبية أو الدعم الذي تقدمه الجهة في شمال شرق سورية في مجال التعليم والتدريب الطبي
How many students/trainees are there currently in your institution/courses(Average annual) كم عدد الطلاب سنويا أو المتدربين في مؤسستكم أو برامجكم التدريبية Hint: Gender, speciality…other demographies
What is/are the **aim**/s of the current interventions in relation to the NES context? ما هي أهداف الدعم الذي تقدمه الجهة في مجال التعليم والتدريب الطبي
What are the main **challenges** facing the interventions? ما هي التحديات التي تواجه عمل الجهة

How are you **dealing** with those challenges?
طرق التعامل مع هذه التحديات

What are the main **lessons** learnt through your work in the NW Syrian health education's context?
ما هي التوصيات الرئيسية والدروس المستفادة من التجارب السابقة من قبل الجهة

What is the type of **support** needed
ما هو نوع الدعم الذي تحتاجه الجهة لتجاوز التحديات

Annex B – Formal medical education survey

Questions / information
Type of health science institution/school: الجهة الأكاديمية
Supporting authority- Accreditation الجهة الداعمة أو الجهة المقدمة للاعتراف
Geographical location الموقع الجغرافي (المدينة والقرية)
Funds available كمية الدعم المالي (بالدولار سنوياً)
الجهة أو الجهات المقدمة للدعم المالي أو مصادر توفير الدعم المالي funding sources
Funds unavailable (كمية الدعم المالي الغير المتوافر (ما ينقص الجهة الأكاديمية بالدولار سنوياً
Registration fees/scholarship for students per year رسوم تسجيل الطلاب (بالدولار سنوياً)إن كانت منحة يرجى الشرح
Number of deanery staff of institution/school عدد الكادر العمادي
Qualifications of deanery staff in each medical school: - المؤهلات الأكاديمية للكادر العمادي - عدد حملة الدكتوراة - عدد حملة الماجستير- اختصاص صحة
Training available for deanery staf f التدريبات التي يتلقاها الكادر العمادي
Training unavailable for deanery staff التدريبات التي لا يمكن توفيرها للكادر العمادي
Managerial staff available عدد الكادر الإداري

Managerial staff unavailable
عدد ونوع الكادر الإداري الغير متوافر حالياً مع الحاجة له

Training available for managerial staff
التدريبات التي يتلقاها الكادر الإداري

Training unavailable for managerial staff
التدريبات التي لا يمكن توفيرها للكادر الإداري

Number of terms at institution/school
عدد الفصول الدراسية في السنة الاكاديمية الواحدة

Number of academic years till graduation
عدد السنوات الدراسية حتى التخرج

Number of students
عدد الطلاب في جميع السنوات

Number of modules taught till graduation
عدد المواد التي يتم تدريسها حتى التخرج

Number and name of modules not taught in each yea
عدد واسم المواد التي ينقص تدريسها حالياً r

Reason of untaught modules
سبب نقص تدريس بعض المواد

Number of teaching staff - in person and diaspora عدد الكادر التدريسي في الداخل وفي المغترب

Qualification of teaching staff for each module
المؤهلات الأكاديمية للكادر التدريسي

Training available for teaching staff
التدريبات التي يتلقاها الكادر التدريسي

Training unavailable for teaching staff
التدريبات التي ينقص توفرها للكادر التدريسي

Teaching approach
الطرائق التدريسية المتبعة

Curriculum implemented
المنهج المتبع في التدريس

Infrastructure building and equipment available to aid teaching
البنية التحتية المتوافرة لمساعدة التدريس

Infrastructure and building and equipment unavailable to aid teaching
البنية التحتية والمعدات التي ينقص توافرها حالياً لمساعدة التدريس

Research module available? Which year? Unavailable? Reason?
هل يتم تدريس مادة الأبحاث الطبية؟ في حال نعم-في أي سنة-في حال لا ما الأسباب

Work opportunities post-graduation
(مدى توافر فرص العمل للخريجين بعد التخرج (النسبة المئوية التقريبية للخريجين الذين يتم توظيفهم في سوق العمل

Enrolment criteria
معايير القبول في بدء الدراسة

Sustainability of educational programme
سنة تأسيس البرنامج التعليمي وهل تم توقف التدريس لفترة ما

Assessment criteria
معايير التقييم النهائي

Clinical training available
هل يتوافر تدريب سريري للطلاب خلال سنوات الدراسة-في حال لا ما السبب

Annex C – RHIS questionnaire

Code	Component / Item	Score: 0 – 4
1. Management and Governance		
	1.1 Policies & Planning	
	Legal and Regulatory	
1.1.1	There are up-to-date legislation and detailed regulations for facility-based information, including private health facilities (if no, proceed to 1.1.5)	
1.1.2	Health information legislation and regulations clearly articulate roles and responsibilities at all levels	
1.1.3	Health information legislation and regulations clearly identify and articulate decision-making authority	
1.1.4	Legislation or policy includes mechanisms to ensure privacy and confidentiality of personal information	
	Planning	
1.1.5	There is a comprehensive, costed five-year plan, with clear roles and responsibilities and involving all stakeholders	
1.1.6	The routine health information plan is integrated with (meaning, it responds to the information needs of) the overall health sector strategic plan	
	Oversight and Coordination	
1.1.7	Country health programs, development partners, and donors support harmonization and alignment around country facility-based information system strategies	
1.1.8	Governance councils or oversight committees are established to provide an independent, objective assessment of data availability and quality (for example, a technical working group for RHIS)	
	Guidelines and Policies	
1.1.9	Appropriate guidance is available on data collection, reporting, analysis, dissemination, and use of data appropriate for the different levels of the health system	
	1.2 Management	
	Standard Operating Procedures	
1.2.1	Standard operating procedures (SOPs) have been written that define roles and responsibilities for data compilation, reporting, data analysis, dissemination, and use	
	Leadership	
1.2.2	There is a demonstrated commitment from senior management to a high-performing RHIS that is specific to different levels of the health system	
	Feedback	
1.2.3	Feedback is systematically provided to all sub-reporting units on the quality of their reporting (that is, accuracy, completeness, and timeliness)	
1.2.4	Feedback is systematically provided to all sub-reporting units on the use of data for decision-making	
	Supervision	
1.2.5	There are guidelines for supportive supervision for RHIS, including standardized supervision checklists	

1.2.6	Findings from supportive supervision visits are reviewed and acted on to correct deficiencies in the RHIS	
1.2.7	Standardized supervision reports are completed to track results and monitor trends	
1.2.8	A schedule of regular supervisory visits is implemented	
1.2.9	RHIS performance (that is, data quality and use of data for decision-making) is assessed when performing supervision visits to health facilities	
	Assessments and Use of Assessments	
1.2.10	There are regular, formal performance assessments of the facility-based information system linked to the strategic planning cycle (for example, PRISM, which measures performance in terms of levels of data quality, data use, and management capacity)	
	Master Facility List	
1.2.11	There is a comprehensive, singular, master list of health facilities, with unique facility identifiers and service domains, and which includes the private sector and special facilities (military, etc.)	
1.2.12	There is a formal mechanism to update and keep the MFL current (for example, a census of all facilities is conducted every five years)	
	1.3 Human Resources	
	Workforce Planning	
1.3.1	Required staffing positions for the RHIS and their respective knowledge, skills, and competencies have been identified, specific to the level of the health system (community, facility, district, etc.)	
1.3.2	There is a workforce development plan with national standards for required positions and functions. The plan establishes career paths for RHIS positions and includes professional development opportunities	
1.3.3	A workforce assessment has been carried out to map existing cadres to the required job positions and to identify gaps in positions and capacities	
	Training & Capacity Building	
1.3.4	There is a costed workforce training plan that covers both pre-service and in-service training	
1.3.5	A standardized training curriculum is being implemented	
1.3.6	There is coordination of training institutions to ensure that standard health facility and community information system modules are used in training events	
1.3.7	A database on training is maintained to track which cadres have received which training, when, and where to help identify the training needs of institutions and individuals by geographical subunit in the country	
2. Data and Decision Support Needs		
	2.1 Data Needs	
	Core Indicators	
2.1.1	There is national and partner agreement on a balanced and limited set of facility-based indicators with standard definitions and appropriate disaggregation (for example, age, sex, administrative area)	
2.1.2	Baselines for key indicators are defined at national and subnational levels, and indicator targets are clearly articulated and feasible based on health system capacities and improvement plans	
2.1.3	The national data and metadata dictionary is aligned with global standards and includes definitions, data sources, data collection methods, reporting frequency, dissemination methods, and use	
	Facility-Based Data on Mortality and Causes of Death	

2.1.4	There is an agreed on minimum set of national mortality data to be collected by all hospitals and health facilities (at least data on deaths by sex and age should be captured)	
2.1.5	The international form of the medical certificate of the cause of death is used in all facilities for the medical certification of death	
2.1.6	Certifying physicians have the knowledge and skills needed to accurately complete the international form of the medical certificate of the cause of death and are aware of the importance of correct cause-of-death certification	
2.1.7	The International Classification of Diseases (ICD) most recent revision (or DHIS 2 Start-Up Mortality List [SMoL]) is used for coding the causes of death.	
2.1.8	Statistical clerks and health information officers have the training and reference materials needed to code deaths and disabilities according to the ICD	
2.1.9	Systems for the automated coding of the causes of death are progressively used (for example, DHIS 2 SMoL).	
2.1.10	Use of verbal autopsy (VA) is being gradually expanded to generate nationally representative cause of death statistics	
	Community-Based Service Data	
2.1.11	Community-based information needs are defined according to a community needs strategy	
2.1.12	A minimum set of community-based indicators (with standard definitions, and appropriate disaggregation and frequency of collection) have been developed to monitor the implementation of community-based interventions	
2.1.13	Standard data collection tools have been developed to facilitate the collection of data from community-based interventions	
2.1.14	Community-based interventions and data are appropriately linked to health facilities to facilitate management, oversight, and reporting	
2.1.15	Assessments are conducted to map community-based programs (public and private) to understand coverage and information gaps/opportunities at the community level	
	Surveillance	
2.1.16	List of priority diseases and syndromes with standard case definitions under current national surveillance is defined	
2.1.17	Public and private healthcare facilities, laboratories, and communities contribute to routine case detection	
2.1.18	The country has adequate capacity to diagnose and record cases of notifiable diseases	
2.1.19	Completeness and timeliness of weekly surveillance reporting exceed national targets (for example, 80%)	
2.1.20	Data are analysed on a regular basis at the different levels to detect events involving cases or deaths above expected levels for the particular time and place	
2.1.21	Alert/action thresholds have been defined for priority diseases and syndromes	
	2.2 Standards and System Design	
	Standards and Data Architecture	
2.2.1	International or national classifications are used for categorizing aggregated data (ICD, facilities, human resources, essential drugs)	
2.2.2	Indicators are harmonized with donors and implementing partners	
2.2.3	There is an integrated common data repository (for example, a data warehouse) for all facility-based data that can grow and adapt to changes and new requirements	
2.2.4	The facility-based information system is interoperable with other systems at all levels	
2.2.5	There are adequate and well documented facility-based metadata available to facilitate interoperability of electronic information systems	
	System Design	

2.2.6	The design of the health facility and community information systems included input from end users and other key stakeholders at all levels	
2.2.7	Data producers and users are brought together periodically to discuss ways of making routine data more relevant to policy makers and planners and to enhance the understanding of routine health statistical findings	
3. Data Collection and Processing		
	3.1 Collection and Management of Individual Client Data	
	Standard Forms	
3.1.1	Data collection systems for client data (for example, clinical episodes) are standardized across all implementing partners and donors	
	Training	
3.1.2	Personnel (clinicians and other staff) have been trained in the collection of client data and how to input the data in the computer database (where applicable)	
	Guidelines	
3.1.3	Printed guidelines are available at all health facilities (and in applicable community-based programs) to assist with client-level data collection	
	Data Storage	
3.1.4	Health data (paper or electronic) are stored appropriately and according to national policies	
	Reproduction	
3.1.5	There is a schedule/plan for the update, reproduction, and distribution of data collection tools	
	3.2. Collection, Management, and Reporting of Aggregated Facility Data	
	Data Flow	
3.2.1	The data flow pattern (that is, data flow from client encounter forms -> summary tools [for example, a register or tally sheet] -> a periodic aggregate reporting form) is clearly defined and understood by staff	
	Guidelines	
3.2.2	There are printed guidelines available at all health facilities (and in applicable community-based programs) to assist with data compilation and reporting	
	Training	
3.2.3	Relevant staff at health facilities (and in applicable community-based programs) have received training on data compilation and reporting	
	Data Disaggregation	
3.2.4	Data disaggregation by key stratifiers (age, sex, geography) are maintained during their compilation and transfer to permit equity analysis	
	Data Transfer	
3.2.5	Data transfer to the next level occurs in a timely way, making use of innovation and information technology (IT) where appropriate and available	
	3.3 Data Quality Assurance	
	Planning	
3.3.1	There is a data quality assurance plan that is shared with health programs, other government ministries, donors, and other stakeholders to guide activities aimed at improving data quality	
	Standards	
3.3.2	Routine health data quality assurance standards are defined and enforced, including completeness, timeliness, accuracy, integrity, and consistency over time	
	Roles and Responsibilities	

3.3.3	Roles and responsibilities for data quality are assigned at each level, including verification of data, summarizing data quality issues, and developing and implementing improvement strategies	
	Training	
3.3.4	Training and capacity development on data quality assurance are provided at facility, district, and national levels using standard methods	
	Assessments	
3.3.5	Systematic and comprehensive assessments of facility data quality are conducted regularly in advance of health sector planning, including analysis of completeness, timeliness, accuracy, and consistency over time (for example, a DQR), which result in published reports describing data quality issues and plans to address them	
	Data Quality Checks	
3.3.6	Data management staff conduct regular checks of the accuracy and completeness of data prior to submitting reports to the next level (using automated electronic checks, where appropriate)	
	Links to Health Sector Planning	
3.3.7	Data quality assurance is linked to the health sector planning cycle in the country so that information on data quality is available prior to the use of data for planning	
	Collaboration	
3.3.8	There is collaboration among the Ministry of Health (MOH), government agencies (for example, the national statistics office), and other national stakeholders (for example, donors, universities) on data quality assurance so that assessments are conducted with an element of independence (that is, with no conflict of interest)	
	3.4 Information and Communication Technology (ICT)	
	ICT Framework	
3.4.1	There is an overall framework and plan for ICT, including equipment, its acquisition, and its use for the RHIS at all levels	
	ICT Use	
3.4.2	Electronic methods are used for data quality checking prior to data transfer	
3.4.3	Data collection uses eHealth and mHealth solutions, where appropriate, especially for remote and isolated areas	
3.4.4	Routine microdata are made available (that is, a subset of data from the RHIS are selected according to specific criteria) to researchers and analysts from other government agencies, donors, and the private sector (with appropriate safeguards for confidentiality, for example, stripping the dataset of identifiers)	
	Training	
3.4.5	Personnel have received appropriate training, using a standardized training curriculum, on the use of ICT at all levels	
4. Data Analysis, Dissemination, and Use		
	4.1 Data Analysis	
	Data Analysis	
4.1.1	There are collaborative mechanisms established with local research and academic institutions to conduct analytical reviews of facility data on a periodic basis	
	Data Cleaning	
4.1.2	General principles for analysis of facility data are defined (for example, as SOPs), including how to deal with incompleteness, inconsistency, implausibility, estimation of denominators, imputation of missing values, and data reconciliation across data sources	

	Performance and Progress Reports	
4.1.3	Health planners and development partners use the results of the analysis of facility data to produce analytical reports on progress and performance for the health sector review	
	Analysis Tools	
4.1.4	Tools used for data analysis, such as summary tables, graphs, geographic information system, pivot tables, decision support systems, etc., are appropriate for the level	
	Data Sources	
4.1.5	The information system uses appropriate data from a variety of sources, for example, census data, vital event registers, population surveys, to calculate key indicators	
	Training	
4.1.6	Appropriate staff (that is, facility and community information system managers, program managers, facility in-charge, etc.) have received training in data analysis	
	4.2 Information Dissemination	
	Information Products	
4.2.1	A report of health facility statistics is produced annually	
4.2.2	Periodic data summaries (for example, bulletins) are produced and distributed to key stakeholders describing key findings and interpretations	
4.2.3	Dashboards and summary charts are used to convey information to diverse target audiences in ways that are meaningful to policy makers, the media, and the general public	
	Strategies	
4.2.4	There is a comprehensive data dissemination strategy relevant to each level of the health system, with key products defined	
	Collaboration	
4.2.5	There is collaboration and data sharing between among the MOH, local institutions (for example, national statistics offices), global partners, the media, and civil society	
	4.3 Data Demand and Use	
	Information Culture	
4.3.1	A culture of information use is promoted by policy leaders and decision-makers, and is reflected in the use of facility and community-based data in planning, monitoring, and evaluation reports	
	Data Demand	
4.3.2	There is demand for information by donors, policy makers, planners, program managers, etc.	
	Data Use	
4.3.3	Clinical practitioners use clinical data routinely to monitor patient care and outcomes	
4.3.4	Facility managers use data to improve infrastructure, equipment, and human resources	
4.3.5	Local level decision-makers and community members use facility and community-based information to develop responsive and appropriate service delivery strategies and community-based interventions	
4.3.6	Facility and community-based data are used in health sector planning (for example, health sector reviews)	
4.3.7	The managers of routine health information reporting at all levels have sufficient autonomy to define their own interventions and data needs (for example, instituting a local outreach effort to improve coverage and the collection of data to monitor the effectiveness of the intervention)	