

YEMEN REPRODUCTIVE HEALTH SUPPLY CHAIN MANAGEMENT: NEEDS ASSESSMENT 2016



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ABBREVIATIONS

EPI	Expanded Programme on Immunization
FEFO	First to expire, first out
IRC	International Rescue Committee
LMIS	Logistics management information system
MoH	Ministry of Health
MoPHP	Ministry of Public Health and Population
NCCH	National Central Coordinating Committee for Health
NGO	Non-governmental organisations
OFDA	Office of US Foreign Disaster Assistance
PEC	Public Electricity Company
PSA	Pamela Steele Associates
RHCS	Reproductive Health Commodity Security
RMNCH	Reproductive, maternal, new-born and child health
UNFPA	UN Population Fund
UNICEF	UN Children's Fund
USAID	US Agency for International Development
WHO	World Health Organization

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Any errors that remain in the text are the author's.

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EXECUTIVE SUMMARY

Background

Against the background of the many humanitarian challenges in Yemen the public sector supply chain in the country is not working well. There are shortages of essential medical supplies and equipment in many districts. Yemen's health system is largely dependent on what the World Health Organization (WHO) and its humanitarian partners can bring into the country – but these supplies are not sufficient to fill all the gaps.

Pamela Steele Associates (PSA) has been instructed to carry out a needs assessment and a competency assessment to understand the current challenges in the reproductive health supply chain. The assessments were carried out through two different surveys administered to informants involved in the supply chain. To present and validate assessment findings a workshop took place in Jordan in December 2016. This has set the foundations for developing a five-year strategy for improving the reproductive health supply chain in Yemen.

Results of needs assessment

The needs assessment revealed flaws along the reproductive health supply chain. The main issue seems to be a lack of budget at the Ministry of Health (MoH) level for fundamental supply chain functions. Nevertheless, some cause for cautious optimism can be found in the fact that most survey respondents believe that it is either possible to improve Yemen's reproductive health system even while the political conflict is ongoing.

Regarding *transport and infrastructure*: Most respondents listed lack of finances as the key issue. In addition, roads are poor, vehicles are scarce, the ongoing fighting is destroying transport links, and there are no leaders overseeing the transportation process

Regarding *distribution*: Respondents reported that there is no budget for distribution or for security. At the same time, the distribution system needs to become more coordinated. Respondents believe workers and supplies should be regularly monitored, to avoid depletion of medicine stores.

On *warehousing*: According to respondents, warehouse space is being destroyed by ongoing fighting. In addition, staff are lacking in the necessary training and storage conditions are not always appropriate. Many respondents think warehouses designed especially for reproductive health should be built.

On *quantification, planning and procurement*: Respondents reported that there is no budget to estimate need or to purchase the necessary amount of goods. Poor availability of data is another significant problem referred to by respondents – there is

a need for better information systems to enable accurate needs assessments to be carried out.

Regarding *procurement*: Respondents reported that the cost of medicines has increased. Lack of baseline data available on the levels of supplies and costs means basic procurement standards and procedures cannot be adhered to. High reliance on aid agencies and international donors means Government fail to take initiative. Respondents believe that there is a need for a specific procurement budget.

On leadership and supervision: Almost half of respondents described leadership as 'weak' or 'very weak'. Leaders need continuous training to strengthen their skills and pass down knowledge to the rest of the system. Respondents believe there is a need for a special budget for leadership training.

On workshops, capacity training and capacity development: According to the respondents, the workforce is not good enough in terms of its size and the training it receives. There is also a distinct lack of worker supervision.

On information systems: Respondents stated that data collection is based on manual system and is inefficient. Manual systems need to be upgraded to electronic ones and applied to all health facilities. Some respondents said that workers need to be trained in information systems in an ongoing way.

Regarding *financing*: Half of all respondents said that there was no budget allocated at all by the MoH. Donor funds are therefore vital. However, donors are filling a void and so national leaders are not working out a strategy for how to stand on their own two feet and provide the services themselves. Some respondents criticised donors for a lack of transparency and a tendency to provide assistance that supports their own overall goals.

On the role of the private sector: 70% of respondents believe that the private sector has a role to play in improving Yemen's reproductive health system. Several respondents praised current actions of the private sector as they have been responsible for offering emergency relief in the absence of ministry action.

Results of competency assessment

The competence self-assessment survey was administered to health and supply chain specialists and MoH staff in order to establish the baseline for efficient capacity building. Most of the respondents are the top management of their respective organisations – directors of national programmes or heads of health departments.

The competency survey results emphasise that, despite good education, significant working experience and successful career development, 20% to 48% of respondents identify gaps in their knowledge and skills in almost every important area of the health supply chain.

The issues are particularly evident in competencies related to procurement, storage and distribution, rational use of medicines and resource management. Regarding procurement, expertise in important areas like building and maintaining supplier relationships, managing tendering processes, and contract management appears to be low. On storage, warehousing and inventory management, the lack of expertise among the respondents is also marked, reaching 40% of respondents. In addition, as many as a third of respondents report only superficially knowing about the procedures for reporting product consumption and dispensing commodities to patients. In regard to resource management, a third of respondents only have the bare minimum of skills relating to preparing for product supply during disasters and emergencies, and almost half have only basic expertise in managing and planning supply chain projects. Overseeing operations of logistics management and information systems is another area where many (25%) respondents have deficient knowledge.

The procedures for selecting health commodities appear to be less problematic. However, even in this area of supply chain management nearly 28% of respondents expressed concerns over the adequacy of their knowledge regarding selecting the appropriate product.

With regards to professional and personal development, the respondents confidently reported having high levels of expertise and skills in communication, problem-solving and leadership. Nevertheless, such important aspects as professional ethics and legislative framework remain an essentially grey area for 31% of respondents. Even in relation to generic skills, 40% of respondents identified a need for improvement.

In sum, the survey results show that high-level managers and leaders in supply chain still believe there are important competency issues in almost every area of the health supply chain in Yemen.

Workshop insights

The results from the surveys were presented to the Government representatives and the inter-agency group in a workshop in December 2016, in order to arrive at a consensus on the main areas for strategy development in regard to improving the reproductive health supply chain in Yemen. The workshop yielded insights regarding various areas of the supply chain.

Forecasting

The workshop highlighted that forecasting only takes place at the central level, the forecasting software is dated and the forecasts are very basic and are updated only once a year and very loosely. There is a need to move towards a system of forecasting based on actual usage of commodities by the population of Yemen. The spread of mobile technology provides a reliable tool to provide data on consumption levels from the health facilities on a regular and frequent basis. It is not known at the moment if such a technological system could be created using the skills and experience that exist

in Yemen but this is certainly worth exploring. A second area for improvement would be to upgrade the hardware and software being used by the MoH. In summary, improvements in forecasting based on accurate, technologically enabled, consumption data offer great potential for improving the supply chain for reproductive health commodities in Yemen.

Procurement

The workshop identified the fact that although the Yemeni reproductive supply chain can count on local procurement, the vast majority of reproductive health commodities used in the Yemen MoH are procured from international suppliers and imported into the country, partly due to donor and UN agency concerns, and partly because the pricing system has created failures in the local market. There are some clear actions that could be taken to mitigate these challenges and failures: procedures tailored to supporting local procurement can be created and implemented, based on best practices adopted elsewhere to reduce the risks of fraud and high pricing. The competencies of staff devoted to procurement can also be developed. In addition, UN Population Fund (UNFPA) and the MoH could undertake a comprehensive and continuous analysis of the local market in terms of availability of suppliers and level of competition.

Importing

The workshop discussed the fact that the vast majority of reproductive health supplies are imported into Yemen by sea but procedures for unloading supplies off an arriving ship are lengthy. However, since such problems are widespread internationally the workshop decided that the supply chain strategy should focus on areas other than importing since this is a known time delay that can be planned for.

Warehousing

In regard to warehousing, the workshop established that although there are three warehouses used for reproductive health commodities by the MoH in Sana'a (with the main warehouse in need of repair), as well as storage facilities at regional, governorate, district and health facility level, the lack of information about inventory at multiple levels in the supply chain is a fundamental block on efficient customer service and on reducing storage and leakage costs.

Distribution

The workshop identified that there are improvements to be made in regard to the warehousing situation, in terms of improved forecasting, inventory visibility and consideration regarding which storage facilities are made use of, potentially including regional warehouses. The workshop also raised the idea of health facilities bringing commodities back when they visit the districts to collect staff salaries. The workshop

also acknowledged that there may well be other improvements to distribution that can be made but that are not clear now, due to a lack of data.

Funding

One of the main challenges identified from the results of the survey is the fundamental lack of available and allocated funding at every level and function of the reproductive health supply chain. As discussed in the workshop, transparency over costs and available funding is a medium- to long-term goal that is overarching the supply chain strategy as a proxy. It does not fall strictly into the strategy definition; however, it is essential for strategy implementation

Overall findings and recommendations

- **Transport and infrastructure:** More funds need to be made available for transport, and strong leadership is essential if the approach to transportation is to be coordinated.
- **Distribution:** Continuous provision of supplies remains a problem and a coordinated system to transport commodities across the system has yet to be put in place. Funding should be sought urgently for distribution from the governorates and districts to health facilities.
- **Inventories:** The viability of creating a snap-shot of inventory in the various storage locations should be investigated, with a view to identifying issues in the flow of commodities.
- **Warehousing:** it would help to develop national guidelines for warehousing.
- **Quantification and planning:** Cooperation needs to take place across the entire Yemeni medical system.
- **Procurement:** The main procurement challenge is the lack of a specific budget set aside for procurement, and the distorted local market conditions. There is a need to investigate whether the MoH and UNFPA can envisage local procurement procedures for exceptional circumstances.
- **Workforce:** Reproductive health workers are generally lacking in numbers and their distribution is poor. Continuous training appears to be vital at all levels.
- **Information systems:** there is a need to investigate the level of IT and mobile technology capacity skills in the MoH and in Yemen as a whole, with a view to understanding whether a home-grown SMS-based consumption forecasting solution could be created.

- Supply chain management: the chain of command and lines of responsibility in the supply chain should be created or clarified, and the Logistics Committee attached to the Public Health Working Group should be resurrected.
- Financing: The issue of financing underlies all the other problems identified in relation to Yemen's reproductive health system; clearly, there is a real lack of available funds.
- Private sector: the private sector has great potential but specific policies are required to allow for coordination.

A five-year strategy for improving the Yemen reproductive health chain

The themes discussed during the workshop towards a strategy can be broken down into four areas, with initial comments on cost:

Capacity building

A theory of change should be used for capacity building as this will ensure that capacity building is successful. Also, on-the-job training should be used for capacity and skills building. For a five-year theory of change implementation, an amount of \$150,000–180,000 a year is estimated.

A national procurement agency

The previously existing Drug Fund should be re-instated as such a Fund offers the chance to create the potential for an efficient, internal market-driven supply chain for health commodities. Further investigations are needed to understand how such an agency could fit into the supply chain and play a parastatal role successfully, as has happened in other countries. It is estimated that seed funding of \$60,000 will be required to provide a business case for the fund.

A technology/IT development road map

A road map should be established for technological upgrading and innovation: firstly, to gather forecasting data, and, secondly, to improve the inventory visibility. Before this can be safely undertaken there is a need to understand better the technology infrastructure in Yemen, as well as understanding what is already being used. SMS could provide a fundamental change to the way the Yemen supply chain is managed and this should be investigated. The use of SMS technology would represent the first step in developing a visibility tool, often referred to as a 'control tower'. The development costs of a control tower can be estimated at \$250,000.

Renovation of structures and equipment

Some of the physical infrastructure of the supply chain is damaged or in a state of disrepair. There should be a planned replacement rather than waiting till these assets

break down. Successful improvement of the supply chain requires that the chain's physical assets be in a good condition. In terms of cost, this area requires more investigation given the current state of the country and the complexities related to building new infrastructure and equipment, or renovating existing items.

BACKGROUND

A multitude of humanitarian challenges continue to exist in Yemen, the causes of which are as complex as the operating environment itself. Endemic poverty, and a distinct lack of livelihood opportunities, are generally considered to be the primary underlying drivers of vulnerability (Ahmed and Jensen, 2014). In the eyes of many commentators, the political events of 2011, and the resulting instability and conflict, have greatly undermined the fragile coping mechanisms of people already existing at the margin (Ahmed and Jensen, 2014; Office for the Coordination of Humanitarian Affairs (UNOCHA), 2015).

The way in which parties to the conflict in Yemen have disregarded international humanitarian law has had a high human cost. 1,400 innocent civilians have lost their lives during the fighting, and over 12,000 people have been injured (UNOCHA, 2015). Targeting explosives at civilian infrastructure, including hospitals and water installations, has meant that as health needs have grown, access to vital healthcare has been significantly reduced (Dube, 2015). Indeed, the ambulance service in the vast majority of areas is non-functional due to fuel shortages and threats to the security of health workers, and the nation is experiencing a severe shortage of essential medicines to treat both emergency trauma and chronic diseases (ibid.).

There have been, in the past, some attempts to manage the supply chain in Yemen, although this has proven challenging due to national systems being destroyed by the ongoing fighting and resulting humanitarian crisis; for example, the eDEWS system for disease surveillance and outbreak response has been significantly affected by the inaccessibility and disruption of communication channels (UNOCHA, 2015). In response to this, UNFPA and other partners have responded by contracting private institutions to address certain aspects of supply chain management, although the distribution of commodities in this way means that there is an absence of influence by the Yemeni Government. This means that the system will remain vulnerable and fragmented unless work is done to determine how the health system can be strengthened and made more sustainable into the future.

The present project included a needs assessment and a competency assessment of the reproductive health supply chain in Yemen carried out through two different surveys administered to the same pool of informants. 47 responses were received for the needs assessment and 39 for the competency assessment. In addition, a three-day workshop was delivered in December 2016 in Jordan to fine tune the results and to set the foundations for a five-year strategy.

METHODOLOGY

SURVEY – NEEDS ASSESSMENT

SurveyMonkey was used as a convenient platform through which to share a lengthy survey which was focused on two core aims: to collect information on what the challenges are to the reproductive health supply chain in Yemen, and to gather opinions on what the best way to address these challenges would be. A total of 47 responses were received from individuals with a great deal of experience in reproductive health in Yemen, including heads of reproductive health in various districts, as well as directors, store-keepers and technical assistants working in the Population Sector.

The survey began with a broad, overarching question that asked what participants would describe as the biggest challenge to Yemen's health system, and subsequently proceeded to collect further detail on the individual problems listed. 44 participants responded to the initial question. Given the number and range of those issues which received the votes of more than 40% of individuals as being the biggest challenge to the health system (nine issues in total), it is clear that a single issue cannot be identified as the most problematic. Evidently, there are multiple problems, many of which feed into, and exacerbate, others, creating a complex situation within which the reproductive health system needs to continue operating. Transport was identified as a significant challenge by the largest share of respondents: 61%. However, factors such as infrastructure, financing and information systems inevitably feed into the process of transportation.

Participants were also given the opportunity to list other problems not listed in the response options to this question, and of the nine who selected to do this, almost all referred to the ongoing political crisis and related security troubles. It may perhaps be surprising that this was not listed as an issue in the question response options, given the way in which political and security challenges are emphasised in the literature review section of this study, but political insecurity can be seen as the overarching factor which feeds into, and causes, all other issues. As such, although security is not discussed as an explicit factor on its own in any part of the results analysis, it is mentioned in the majority of answers in relation to other issues and so will be touched upon throughout.

SURVEY – COMPETENCY ASSESSMENT

The competency assessment survey was conducted in the form of a semi-structured questionnaire, which consisted of 20 questions. The survey forms were printed out and fully completed by 38 respondents from different regions of the Republic of Yemen. Later, the responses were diligently typed in to the SurveyMonkey online software for further statistical analysis.

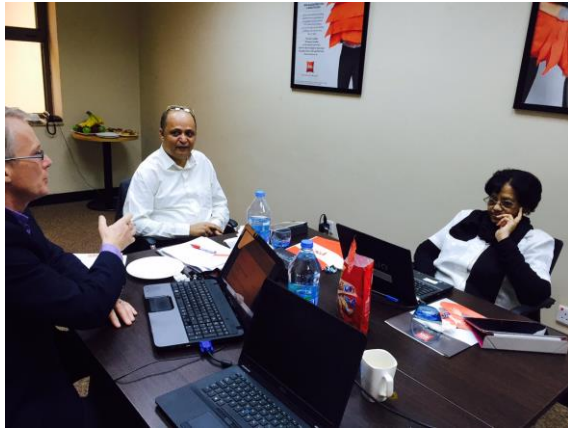
The survey questionnaire consisted of two parts. The first part aimed at collecting general data: respondents' age, gender, professional experience, organisation and current position etc. The second part of the survey focused on specific aspects of competency assessment. All but one question received responses from all respondents (one question was skipped by only one respondent). The survey results offer a regionally and organisationally diverse sample and a good gender distribution of respondents, with 41% of women participants.

The second part of the survey collected data related to decision-making about appropriate selection of medical products, quantification, procurement, storage and distribution, rational use of medicines, resource management and professional management. The respondents were requested to state the importance of these professional responsibilities and to assess the level of their own experience in dealing with these daily tasks.

WORKSHOP – NEEDS AND COMPETENCY ASSESSMENT

PSA and key stakeholders, together with those working within the Yemen reproductive health supply chain, worked together in three consecutive all-day intensive workshops in Amman (Jordan). It was not possible to hold the meeting in Yemen due to ongoing conflict. The initial plan was to bring together most of the current Ministry of Health (MoH) trainers who participated in the survey. Unfortunately, however, at the last minute it became clear that they could not travel to Jordan and so only the UNFPA Reproductive Health Commodity (RHCS) Programme Analysts and the Deputy Minister for the Population Sector (who had been in Jordan for the reproductive, maternal, new-born and child health (RMNCH) inter-agency strategy meeting, entitled 'Consultations regarding Developing National Reproductive Health, New-born and Advocacy Strategies for Yemen') could attend the Jordan meeting. The workshop attendants were divided into Group A and Group B. Group A included the representative of UNFPA RHCS Programme Analyst Yemen and the Deputy Minister for Population Sector. Group B included more than 10 representatives from the Yemeni inter-agency group (the UN Children's Fund (UNICEF), the World Health Organization (WHO), UNFPA, Government and consultants) who had been meeting in Amman from 3 to 13 December 2016 in a meeting.

In the morning of the first day, PSA's summary of the issues that were highlighted by the survey were presented and discussed by both groups, who validated the survey by recognising that the results were accurate and the issues highlighted were the key ones. During the session on the first day, participants were given the opportunity to suggest further challenges not captured in the survey for the groups to discuss.



The majority of the issues identified both by the groups and the survey were then subject to root cause analysis by Group A and PSA. The aim of the root causes analysis was to identify an action list to address the challenges agreed among the participants. On the morning of the second day these actions were presented back to Group B for their feedback on their appropriateness and

validity.



During the rest of the second day, Group A and PSA completed the root cause analysis of the remaining issues not covered on the first day, and created a draft supply chain strategy. This draft strategy was presented to Group B on the morning of the third day and was very well received. Group B committed to incorporating the supply chain strategy into their own strategy, recognising the

fundamental role of an effective supply chain to the provision of health supplies and services to the RMNCH programme beneficiaries.

During the third day, Group A analysed the details of the competency assessment outcomes of the survey, identifying actions to remedy the skills gaps. During this process, the draft strategy was reviewed to ensure that all actions that arose were included. The last step of the three days was Group A and PSA working through the draft strategy to finalise it. This included identifying strategic workstreams, implementation methodologies, quick wins, dependencies, sequencing and actions arising from the workshop.

This three-day workshop process was extremely effective in creating a shared understanding and agreement about the challenges of the RHCS programme in Yemen, and about how to proceed further. This was especially potent given that the survey results had come from front-line Yemeni health professionals engaged in the

day-to-day provision and management of service delivery and the associated supply chain. The fact that managers and directors were starting their analysis with information from the front-line meant that the challenges identified had come from those involved in the health facilities themselves, and were then brought to the attention of those responsible to consider and to seek solutions. There was a wealth of experience across the workshop participants: both experience of the particular circumstances of Yemen as well as PSA's broad and recent experience of health supply chains in other countries, such as Nigeria, Sudan, Syria and Kenya. This allowed for solutions to be identified which are a fit to the local situation, as well as ideas and examples of solutions that are, as yet, unknown in Yemen. Having representatives in the workshop from different constituencies, including medical staff, UN agencies, MoH and professional health supply chain consultants, ensured that a broad range of experiences, concerns and expertise were focused on the process. The spirit of cooperation and mutual respect was exemplary. In PSA's opinion the outcomes of the workshop were first class, showing a strong desire to find solutions, a great sense of teamwork, as well as a strong, pragmatic leadership of the process.

OVERVIEW OF THE REPORT

The report is structured as follows. Firstly, the needs assessment of the reproductive health supply chain in Yemen is presented by covering each of the following topics through a desk review and by reporting the insights from the survey: supply chain, transport and infrastructure, distribution, warehousing, quantification and planning, procurement, leadership, workforce and training, the information system, financing, and the private sector. Secondly, the insights from the survey on competency assessment are presented. Thirdly, outcomes from the three-day workshop are discussed as the starting point for the strategy development and drafting in the following session. Finally, recommendations are provided.

THE SUPPLY CHAIN FACTORS IN THE YEMEN REPRODUCTIVE HEALTH SUPPLY CHAIN

The public sector supply chain in Yemen is not working well (Patykewich et al., 2007). Indeed, there are shortages of essential medical supplies and equipment in many districts (WHO, 2015), and Yemen's health system is largely dependent on what the WHO and its humanitarian partners are able to bring into the country – but these supplies still are not sufficient to fill all the gaps (Gavlak, 2015).

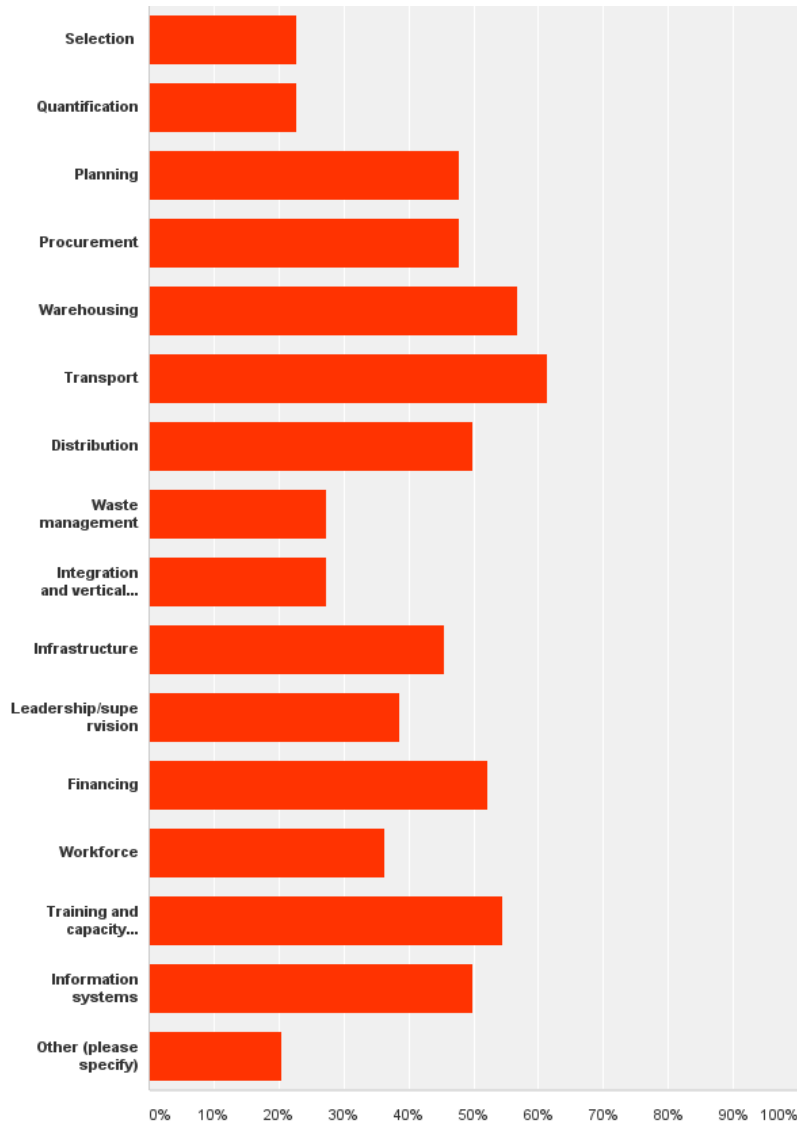
Donors have been criticised for tending to concentrate the majority of their reproductive health resources on capacity building for certain groups of governorates, districts and facilities, for the purpose of developing viable models that could eventually be implemented across the nation (Patykewich et al., 2007). This means the central level is bypassed, meaning that many sectors do not have the tools or resources to ensure that all levels of the health system provide the type of logistics support required for quality care (ibid.). Furthermore, there are some cases where donors have developed alternative logistics systems, and these are complicating the work of Ministry of Public Health and Population (MoPHP) staff at all levels in Yemen (Patykewich et al., 2007). Despite donors providing a degree of technical assistance, supplies and other forms of support, this has not been large enough in scale to allow central-level supply chain managers to have an impact upon the system as a whole (ibid.).

Such existing problems have been exacerbated by the ongoing political conflict and deteriorating economy, as a result of which port operations, surface transport and fuel supplies are disrupted (Logistics Cluster, 2015). Furthermore, commercial flight schedules within Yemen are limited and are insufficient to provide the humanitarian community with access to rural areas in Yemen, where the situation is critical (ibid.).

Although addressing the political conflict in Yemen, and the infrastructural and transportation issues which have resulted from it, is a deeply complicated matter which requires a great deal of political action and external assistance, there are some measures which can be implemented to improve the general operations of the public sector supply chain. Crucially, stakeholders need to support an extensive effort to upgrade the system from top to bottom because, despite the great number of problems which characterise the Yemeni supply chain at this time, such an effort represents a good investment, and is one of the best opportunities for bringing about marked improvement (Patykewich et al., 2007).

SURVEY INSIGHTS

Although the findings of this report suggest numerous reproductive health challenges in Yemen, 66% of survey respondents believe that it is either possible, or very possible, to improve Yemen’s reproductive health system even while the political conflict is ongoing, and it is from this belief that any efforts moving forward should take hope.



What would you describe as the biggest challenge to Yemen's health system?

Although the focus of this study is on identifying the challenges to reproductive health in Yemen, it is important to acknowledge that the picture is not entirely negative. When asked whether the MoH had a health supply chain strategy in place, over 70% of survey respondents answered yes. Furthermore, when questioned on whether there

was a health supply chain champion in Yemen, 69% also gave yes as their answer. It would appear that many participants in this study were aware of an overall supply chain strategy. However, it is perhaps when all the different parts and functions of the supply chain are broken down that the picture becomes more negative.

TRANSPORT AND INFRASTRUCTURE

Transport and infrastructure in Yemen has undoubtedly been severely affected by the political conflict since 2011, and this has impacted on the health system due to the closure of health warehouses, hospitals, laboratories and administrative offices, and the subsequent disruption of medical supplies distribution, health worker displacement and vaccination campaign interruption (Dube, 2015). Since the crisis escalated in March 2015, health facilities have been bombed and humanitarian workers have increasingly been targeted. Almost 23% of Yemeni health facilities are no longer operational, either because they have been hit, they happen to have been located close to military targets, or because they were already in a poor condition (Gavlak, 2015).

Those healthcare facilities which are still operating are reported to have very minimal access to medicines, equipment and vital supplies. The shortage of medicines is a key issue, as is the inability to move supplies to hospitals and healthcare units due to insecurity and fuel shortages (Dube, 2015). The military and Government have been accused by many Yemenis of stockpiling much of the diesel and gasoline they produce (Salisbury, 2011), and ambulance operations have also been disrupted as a result (Dube, 2015). Furthermore, Yemen has one of the lowest ratings in terms of electricity access in the region, with just 54% of people having access, and the country's main Public Electricity Company (PEC) grid concentrates on servicing urban centres, thereby excluding southern areas (United Nations, 2015).

What emerges from the literature is a clear indication that external support and funding, as well as coordination between all involved actors, is necessary if the health system in Yemen is to improve (Salisbury, 2011; Qing and Daud, 2014; Gavlak, 2015; United Nations, 2015). Indeed, in a study by Qing and Daud (2014), regarding the case of managing infrastructure, it was found that although organisations often managed to transport goods from their depot to the disaster area, the efficiency of operations from this point on was determined by the availability of local agencies and the ability to source the right types of transport and determine the location of people in need of assistance. As such, there is clearly a strong need for high levels of coordination and the sharing of resources by all parties which play a role in humanitarian logistics operations (see Kovács and Spens, 2011).

External funding and assistance is crucial. The International Rescue Committee (IRC) and the WHO are both delivering water to large areas of Yemen, while the WHO is supplying fuel to hospitals in order to keep electricity generators running for operating theatres, blood banks and labs (Gavlak, 2015). In some cases, Yemen has its own

available resources, but the country needs external help in order to tap into them. For instance, Yemen has high renewable resources potential, having one of the world's highest levels of wind and solar radiation, and these resources are reported to be capable of providing vital resources for expanding energy supplies to rural communities, while also furthering large-scale commercial power development (United Nations, 2015). Although the Government has set ambitious targets for harnessing these resources, setting a 15%–20% target to increase the renewable energy share in total electricity generation by the year 2025, its potential is highly dependent on external funding (*ibid.*).

The international community has also been prompted to consider working with private sector and state actors to ensure that vital goods and resources reach the country through established supply routes (Salisbury, 2011). Transporting commodities cross-the country should be a key consideration, although it is vital that dialogue with private sector actors runs in conjunction with existing humanitarian responses (*ibid.*).

SURVEY INSIGHTS

When asked for details on the Yemeni reproductive health system's transport and infrastructure challenges, most participants who responded to this question listed the lack of finances for these areas as the main problem. Not only are the roads poor or non-existent, there is a scarcity of vehicles of all kinds by which to transport emergency medicines. Some participants went further, saying that such issues are exacerbated,

KEY POINTS ON TRANSPORT AND INFRASTRUCTURE

- *When asked about transport and infrastructure issues, the majority of respondents listed **lack of finances** as the key issue.*
- ***Roads are poor and vehicles are scarce.***
- ***Ongoing fighting** is a problem – destroying transport links, making areas dangerous to enter and heightening the need for emergency supplies.*
- *There are **no leaders** overseeing the transportation process.*

or are often caused by, the challenging security situation: fighting has destroyed key transport links, made certain areas particularly dangerous to enter, and has heightened the very need for the medical supplies which are unable to be transported.

Several participants also listed a lack of leadership and coordination as a key aspect of the problem when it comes to transportation and infrastructure in Yemen. As one respondent put it: "There is no coordinated transport system from the district to the locality and from the locality to the health unit". Localities are said to not have the necessary support to deliver supplies within their areas, so even where limited transport is available and overseen at a district level, the supplies often do not make it to the people who need it.

Many respondents highlighted the need to make more funds available for the transportation process. Not only could this address the issue of a scarcity of transportation vehicles, it could help to improve the roads themselves, which are worsening in condition as a result of the ongoing fighting. For all of this to be successfully coordinated, strong leadership, from the district level right down to localities, is essential in order for a coordinated approach to be put into place, and for supplies to reach those most in need.

DISTRIBUTION

The health storage and distribution system in Yemen has a clearly defined structure, which involves four levels: central, governorate, district and facility. Procured supplies enter the system at the central level and are then redistributed down until they finally reach clients at the health facility level. A number of specific activities are included within this process, such as customs clearance, inventory control, stock record-keeping and distribution planning, but the overarching goal of the process is to ensure that there are never any stock-outs at any point in the system – and particularly not at the facility level (MoPHP, Republic of Yemen, no date).

However, although a system can be identified, in order to ensure that the Yemeni people are always able to find sufficient quantities of quality health supplies and contraceptives when they visit health facilities, all levels must be performing correctly (*ibid.*). Unfortunately, it has been reported that this is not the case, and a number of problems have been identified in the literature. The problem which is the greatest cause for concern is the high facility stock-out rates; in one study, of 129 clinical and storage facilities, no site had the full range of contraceptives in the MoPHP method mix (MoPHP, Republic of Yemen, no date). It is difficult to pinpoint exactly where the problem lies within the system as the situation varies from facility to facility. Indeed, although there have been improvements in drug supply at CMST, this has not translated into an overall improvement in drug availability, and results are mixed for central hospitals (Khuluza et al., 2016). In a study of drug availability undertaken by Khuluza et al. (2016), results from KCH showed an improvement in drug availability (reduction of stock-out days from an average of 16.33 days to 9.67 days) while for QECH there was no improvement.

Other problems, such as poor housekeeping, lack of knowledge of the key FEFO concept (issuing stock on a first-to-expire, first-out basis), variation in reporting periods among sites, and inaccurate record-keeping, have also been reported (MoPHP, Republic of Yemen, no date). The absence of funding at lower levels for transport is another frequent complaint, although some argue that local transport budgets would be adequate were they used efficiently (*ibid.*). Clearly, there are a multitude of issues within the health distribution system, which all need to be addressed if the overall system, with all its different levels and processes, is to operate effectively and to get supplies to those in need.

SURVEY INSIGHTS

A total of 67% of survey respondents agreed that the distribution of reproductive health supplies and essential medicines is an issue in Yemen – in particular, and as stated in the previous section, the lack of a budget for distribution processes, which includes transport, quantification of supplies, store management and personnel training. Furthermore, several participants highlighted the problem that there is no budget set aside for security, which is vital in a war-torn, politically unstable country. The continuous provision of health supplies continues to be problematic, and a coordinated system has yet to be put in place to transport commodities between districts, localities and health centres.

KEY POINTS ON DISTRIBUTION

- *There is a distinct **lack of a budget for distribution** and also for security.*
- *Respondents called for the **budget set aside for distribution** to be **significantly increased**.*
- *The system needs to become more coordinated and to be driven by **distribution experts who can supervise**.*
- ***Monitoring of workers and supplies** should be regular, to avoid depletion of medicine stores.*

Many respondents called for the budget set aside for distribution to be significantly increased. Several also added that a distribution system should be established which provides coordination between all levels of the health system – one which is driven by experts in distribution, who can supervise the process and ensure that quantities of supplies are precisely calculated. It was also added that the wider workforce should be trained in order to prevent the depletion of medicine stores and the distribution of out-of-date supplies. Furthermore, some respondents called for the monitoring of workers and supplies to be regularly undertaken, with one participant suggesting that the collection of feedback from communities who require health supplies would also be beneficial.

WAREHOUSING

At the governorate level and below, the vast majority of storage facilities fail to meet minimum standards of storage guidelines. Here, the amount of storage space available is not sufficient in volume, is subject to substandard cleaning, and frequently the necessary equipment is lacking. Given the anticipated increase in demand for contraceptives, and the fact that transport and deliveries tend to be arranged on an ad hoc basis, stock-outs are highly likely, thereby limiting the availability of important health commodities to the end-user (Population Sector of the MoPHP, 2012).

Evidently, improvements in the storage conditions at the governorate level and below are required. Direction should be taken from improvements witnessed at the central and regional levels, which have been the result of external involvement. Up until 2009, the Population Sector was supported by UNFPA, in terms of rent and ongoing

maintenance of the central warehouse, and, more recently, the Embassy of the Kingdom of the Netherlands has renovated and equipped central and regional level storage facilities (*ibid.*).

SURVEY INSIGHTS

76% of respondents firmly stated that there are warehouse and storage problems in Yemen's reproductive health system. In particular, several participants referred to a complete lack of storage space in warehouses set aside for reproductive health products in particular. In addition, overall warehouse space is continuously being destroyed as a result of the ongoing war and the staff that are actually in post are said to be lacking in the necessary training in warehouse operations.

Other respondents also highlighted the poor and damaged state of infrastructure in Yemen, which means that many facilities lack electricity, resulting in products not being kept at the necessary temperatures and so being ruined.

A third of all respondents called for warehouses to be built, which are designed especially for reproductive health, and that contain the necessary amounts of storage space for emergency family planning items. Respondents emphasised the need for storage conditions to be at exactly the right temperature, for air conditioning to be used, for an appropriate number of refrigerators to be available, and for certain standards and criteria to be in place for reproductive health products. All of these points should be written into a national guideline for warehousing, as two respondents urged, and a sufficient number of staff need to be in place who are trained to regularly report, monitor and evaluate stocks; these staff, themselves, need to be regularly monitored.

KEY POINTS ON WAREHOUSING

- *Warehouse space is being destroyed by ongoing fighting.*
- *Staff are lacking in the necessary training.*
- *A third of respondents called for warehouses to be built, designed especially for reproductive health.*
- *Storage conditions need to be at the right temperature and there needs to be enough refrigerator space*
- *Two respondents said that these points should be written into a national guideline for warehousing.*

QUANTIFICATION, PLANNING, AND PROCUREMENT

An organisation's ability to plan is a key input into programme development and implementation, and nowhere is this more necessary than in Yemen. The key elements of planning include the ability to clearly define measurable objectives, to specify the activities required for achieving these goals, and to determine what resources are required to meet targets (MoPHP, Republic of Yemen, no date). Given the diversity and sheer number of actors and stakeholders involved in health supply chains, planning is an imperative.

Contraception and family planning services have been identified as an area that is in great need of planning if the supplies needed are to be appropriately quantified, and the correct products procured. In terms of the current situation within the MoPHP, including relations with development partners, there is little appropriate support for the type of planning necessary for implementing RHCS and monitoring progress (MoPHP, Republic of Yemen, no date). Indeed, the historic donor focus on districts and governorates has tended to minimise the Population sector's role in programme planning and, given the importance of issues such as decentralisation of management and resource allocation, close coordination and cooperation between various levels is necessary (*ibid.*). Planning for human resources and personnel management are important pre-conditions for RHCS. They should be integrated in the overall human resources development and workforce management functions of the districts and governorates, with a central coordinating and monitoring role carried out by the Population Sector (MoPHP, Republic of Yemen, no date).

In terms of how to improve the lack of planning which characterises the health sector and, in particular, contraception, in Yemen, there needs to be a nationwide programme to expand and strengthen the family planning services provided (Patykewich et al., 2007). This should be an effort which is highly coordinated with plans for general supply chain improvement, in order to ensure that all sites have the correct mix method available prior to the undertaking of family planning service training (*ibid.*). Within the plan, networks of potential partners at all levels should be established, with expectations formed regarding how each could contribute to RHCS (Patykewich et al., 2007). This would enable priorities for staff time and other resources to be established, by way of making sure that the most important relationships receive due attention (*ibid.*).

Key to health programme planning is rigorous financial planning. Within this, funds must be managed transparently and with great accountability (MoPHP, Republic of Yemen, no date). Within the Population Sector in Yemen, it has been highlighted that, in the past, there has been very little funding for operating costs, including monitoring, supervision, training, equipment, printing, contraceptive deliveries, and the other items necessary for achieving RHCS, the outcome of which is very limited budgetary planning experience and accountability (*ibid.*). An issue for the health sector in Yemen

as a whole is that the Government financial management system is tuned only to broad budget lines, rather than to activities and outputs (MoPHP, Republic of Yemen, no date), meaning that some governorates experiment with their own financial management approaches, thereby complicating the system (*ibid.*). What is needed is for the central level to develop an operational budget for all responsibilities and tasks, including costs related to advocacy, policy development, and cooperation with governorates and other institutions (MoPHP, Republic of Yemen, no date).

At the end of 2009 the MoPHP issued a decree to include contraceptives within the essential drug list, and to allocate a gradually increasing budget for the procurement of contraceptives. However, although contraceptives were included within the essential drugs list the MoPHP failed to allocate a budget for the procurement of contraceptives.

SURVEY INSIGHTS

When asked what issues exist with quantification and planning in Yemen's reproductive health supply chain almost half of all respondents referred to the lack of a budget in place for buying items for health centres and localities, as well as a lack of funds assigned to supervising processes and distributing items. This makes it extremely difficult to estimate

need in the short and long term, to purchase the necessary amount, and type, of goods, and to come up with a solid plan for how to get goods to the areas and people who need them. Similarly, eight respondents criticised the lack of a budget available for the training of workers in information systems, which would help with quantifying need, as well as for training in key supply chain functions and logistics processes: it is essential for workers to be knowledgeable of these functions and processes if the system is to be well planned.

KEY POINTS ON QUANTIFICATION AND PLANNING

- **Lack of budget to estimate need** in the short- and long-term, purchase the necessary amount, and type, of goods, and come up with a solid plan.
- **Poor availability of data** as another significant problem – restricts ability to forecast and predict need. Likely due to poor communication networks between facilities.
- **Need for better information systems**, which would enable extensive, accurate needs assessments to be carried out.
- **Facilities should also be supervised** as an ongoing process.

Eight respondents cited poor availability of data as another significant problem for quantification and planning processes in Yemen's reproductive health system, as this restricts the ability to forecast and predict need. Several respondents also referred to the lack of transparent information available, which, again, can impact negatively on the planning process. A lack of available data is likely a symptom, or even a cause, of

poor communication networks between different facilities, and also between decision-makers and those on the ground – something that three respondents mentioned. This also means that the necessary needs evaluations have not been carried out with regards to the situation in health units and warehouses in localities. As such, a scarcity of emergency reproductive health supplies persists – something that five survey participants were concerned about.

In terms of how the quantification and planning challenges could be improved, 16 respondents called for funds to be allocated to supplies and training. This would improve the quantification processes, as workers would be better able to manage stores, estimate need and forecast quantities required. Workforce training should be ongoing and regular, as seven participants stated. Two participants also emphasised the importance of training heads of reproductive health at both the district level and also within localities at health facilities.

Eight participants discussed the benefits that would be derived from better information systems, which would enable extensive, accurate needs assessments to be carried out so that problems can be identified, and the distribution of supplies planned. Facilities should also be supervised as an ongoing process, with quantification conducted regularly. Three respondents spoke of the importance of cooperation within

the entire Yemeni medical system if the situation is to improve.

KEY POINTS ON PROCUREMENT

- *The cost of medicines has increased.*
- *Lack of baseline data available on the levels of supplies and costs means basic procurement standards and procedures cannot be adhered to.*
- *High reliance on aid agencies and international donors means Government fail to take initiative – external support could stop at any time.*
- *Need for a specific procurement budget.*
- *Planning is essential but lacking – needs assessments should be carried out in all facilities.*
- *Need for donor support in procurement but the ministry is responsible for putting in place flexible procurement mechanisms.*

Over half of all respondents described the main procurement challenge to the Yemeni reproductive health system as the lack of a specific budget set aside by the Government for purchasing items, and, in particular, for reproductive health items. This issue is also compounded by the fact that the cost of many medicines has also increased. Four participants criticised the lack of baseline data available on levels of supplies and costs, which means that basic procurement standards and procedures simply cannot be adhered to. In fact,

one respondent went further, saying that the Government is actually unaware of the

importance of the procurement process and this is why it has failed to focus on it, to give time to the subject, and to provide a budget for it.

A total of eight participants condemned the reliance on aid agencies and international donors in relation to purchasing health items, not only because this has meant the Government has failed to take any action to improve the system and make it sustainable, but also because this external support could stop at any time.

When asked how these procurement challenges could best be addressed, 12 participants emphasised the need for the Government to provide a specific procurement budget. Furthermore, a third of respondents referred to the importance of planning when it comes to procuring the right quantities and types of items to meet need. Needs assessments should be carried out at all health facilities in every district and locality, specifying exact requirements, so that an exact budget can be allocated. One participant mentioned the important role that could be played by a National Special Committee dedicated to buying commodities for all levels of the reproductive health system.

Addressing procurement challenges should not be left solely to the Government, and five respondents emphasised the need for donor support to coordinate with MoPHP's efforts, and to provide emergency medicines. Two respondents mentioned that the Government should take responsibility for the implementation of flexible procurement mechanisms.

LEADERSHIP AND SUPERVISION

Leadership is vital if health systems are to function appropriately, and this has been made extremely difficult by the political leadership void in Yemen. Indeed, it is only when policymakers truly commit to health system improvements that lasting change will be witnessed (Holst and Gericke, 2012). Nevertheless, reinforcement and consolidation of stewardship and governance in the healthcare sector should include initiatives such as the establishment of a National Central Coordinating Committee for Health (NCCH) (Saleh, 2014). This committee should represent all ministries and social insurance organisations that deal directly with healthcare, in order to improve the coordination and efficient use of resources (e.g. delivery of funds and services) and the MoH should serve as the secretariat for the NCCH.

Efforts have been made by humanitarian organisations to address the leadership void which has arisen, in part, because of the political turmoil within Yemen. The United Nations has set up the health cluster, a group of UN agencies which are tasked with responding to a particular aspect of the emergency (Gavlak, 2015). One success achieved by this leadership and coordination was the negotiation of the first humanitarian pause or ceasefire (*ibid*).

However, cooperation with local actors is likely to be highly complex given Yemen's reputation for corruption and the intricacies of the ongoing conflict, and it will be important to put in place at least some form of monitoring system to ensure that funds and goods make their way to their intended recipients (Salisbury, 2011). Realistically, monitoring and evaluation work will require in-country staff engagement with local actors on a detailed, day-to-day basis (*ibid.*).

Strong leadership needs to be in place at all levels and in all sectors of the health supply chain. For example, in order to achieve RHCS, key leaders at the national, ministry, and governorate levels must actively support it – not just verbally, but through their decision-making (MoPHP, Republic of Yemen, no date). The involvement of the Population Sector at the outset is of strategic importance because its advocacy will be required to create and maintain the interest of decision-makers at all levels (*ibid.*). Major developments, such as the ongoing decentralisation, the increasing emphasis on the functional integration of vertical programmes, and the Health Sector Review, provide new opportunities for making reproductive health and RHCS more efficient and effective (MoPHP, Republic of Yemen, no date).

Supportive supervision is an important component of capacity building and combines both an attitude and a process. It creates an environment that drives for change, in so far as it allows staff capacity to be strengthened, thus enhancing their performance (Population Sector of the MoPHP, 2012). Supervisors are encouraged to use supportive supervision techniques with the staff they supervise, in order to continuously improve supply chain performance and commodity availability (*ibid.*). In this effort, the supervision capacity must be strengthened to ensure the ability exists to provide effective supportive supervision.

SURVEY INSIGHTS

Almost half of all participants described leadership within Yemen's reproductive health sector as 'weak', and proceeded to offer a variety of opinions on how it could be strengthened. Continuous training of reproductive health leaders in order to enhance

KEY POINTS ON LEADERSHIP AND SUPERVISION

- *Almost half of respondents described leadership as 'weak' or 'very weak'.*
- *Leaders need continuous training to strengthen their skills and pass down knowledge to the rest of the system.*
- *Need for a special budget for leadership training.*
- *A leadership team, rather than a single individual, could also be beneficial.*
- *There is a distinct lack of worker supervision, with 75% of respondents saying there is none at all – there is a lack of training of individuals to carry this out.*

their skills and understanding was the most commonly cited, as not only would this see leadership itself strengthen, those leaders would also be able to pass their knowledge down to the rest of the workforce. Seven respondents highlighted the need for this training to be ongoing, to ensure that leaders remained up-to-date with new technologies and ways of working. 12 respondents also emphasised the need to have a special budget for leadership training and worker supervision in place if the leadership void is to be appropriately addressed.

Furthermore, rather than having single leaders responsible for entire sections of the reproductive health supply chain, three participants mentioned the idea of having a high quality leadership team, possessing different areas of expertise, as this could create a stronger sense of direction and leadership for the rest of the reproductive health sector.

When questions regarding worker supervision and monitoring were put to respondents, a very clear picture emerged that there is a distinct lack of any such processes, with over three-quarters saying that there is no supervision of supply chain workers at all. Several respondents put this down to a lack of training of members of the workforce to carry out this necessary supervision.

WORKFORCE, TRAINING AND CAPACITY DEVELOPMENT

Skilled healthcare professionals drive health system performance, and well-educated staff, as well as enough staff, are critical to improving health system performance and health outcomes (Al Serouri, 2012). A recent analysis found that the Yemeni health sector is still suffering from a scarcity of human resources and an imbalanced distribution and poor utilisation of the available health cadres, with no adequate system for distributing person power between rural and urban areas (*ibid.*). Thus, staff remain concentrated in the major cities, leaving the majority of rural areas deprived.

Ongoing training of healthcare professionals in Yemen is necessary to ensure that staff are kept up-to-date on new information and guidelines, particularly where their area of expertise is concerned. For instance, Ministries of Health now need specific technical support in the area of health economics and financing to increase their access to, and profile in, cross-sectoral planning processes (Dodd et al., 2009). This cannot be expected without a deeper understanding of key macro-economic concepts, and the capacity to re-frame health broadly in pro-poor economic terms (*ibid.*). With a more confident presentation of the claims of health—and its direct link to productivity — senior MoH staff will find themselves better equipped to advocate for budgetary outcomes that more accurately reflect their capacity to contribute to poverty reduction in cross-sectoral planning processes (Dodd et al., 2009). Furthermore, prescribers in all health facilities should be advised to use the generic names of drugs in prescriptions, to prescribe the lowest number of drugs needed, and to avoid symptomatic treatment whenever possible (Bashrahil, 2007). More effort is needed to ensure that local drug information resources, such as national standard treatment

guidelines and the national formulary of essential drugs, are available at all health facilities (*ibid.*).

SURVEY INSIGHTS

When asked whether the Yemeni reproductive health workforce was good enough in terms of the training it receives and its size in order to meet the reproductive health needs of the people, 57% answered no, with 20% saying yes and the rest answering that they were not sure. Six participants discussed the fact that new, untrained workers are annually recruited to work within reproductive health, yet most receive absolutely no training. As such, even where there are enough workers numbers wise, they are often not fit for purpose – and the field of reproductive health suffers in particular from a lack of expertise.

In many places, however, reproductive health workers are lacking and distribution is poor. One participant referred to the fact that in places where there are not enough doctors, nurses are forced to take on a role for which they are not trained. Three participants similarly referred to the fact that well trained health workers often leave the country to go elsewhere, and some also join the private sector. One respondent provided a stark summary, stating that the reproductive health sector suffers from a lack of insurance for workers and the work carried out, poor salaries, lack of compensation, and a failure on the part of the Government to employ enough staff.

In terms of the training need that exists in the Yemeni reproductive health sector, 16 respondents urged that the workforce be trained in simple supply chain processes and

logistics. In particular, through training the heads of districts in such activities, it is more likely that important training and information will feed down through the reproductive health workforce to the locality and health facility level. More specifically, seven participants also highlighted the importance of training workers in emergency reproductive health, including how to use certain technologies, and how to identify and respond to major health challenges.

In terms of how the training should be funded, two participants argued

KEY POINTS ON WORKSHOP, TRAINING, AND CAPACITY DEVELOPMENT

- The **workforce** is not good enough in terms of its **size** and the **training** it receives.
- There is a distinct **lack of worker supervision**, with 75% of respondents saying there is none at all – there is a lack of training of individuals to carry this out.
- **Importance** of training workers in **emergency reproductive health**, including how to use certain technologies, and how to identify and respond to major health challenges.
- Training should be **continuous and ongoing**, rather than a one-off event.

for the need for concerned parties within the Government and private sector to coordinate to fund the training, and also to provide it. Finally, six respondents referred

to the fact that training should be continuous and ongoing, rather than a one-off event, and that information systems are vital tools to aid in monitoring and evaluating worker performance.

INFORMATION SYSTEMS

An effectively functioning health information system is a cornerstone of any equitable and effective healthcare system, although many low- and middle-income countries are characterised by their poor health information infrastructure, Yemen being one of them (Saleh, 2014). The main role of health information systems is to establish information feedback processes at different levels of the health sector that assess health outcomes, processes, financial, utilisation, and quality indicators among others. The failure to develop these in many national contexts has been partly blamed on international donors, who have actively contributed to the establishment of parallel information systems that match their sponsored vertical programmes, causing fragmentation (*ibid.*).

In Yemen there is a distinct absence of an operational logistics management information system (LMIS); national health information gathering systems are fragmented; reporting is irregular; and data for decision-making are unreliable at all levels, especially when it comes to reporting conflict-related casualties, which is a politically sensitive issue (Population Sector of the MoPHP, 2012; Saferworld, 2016). There are also large disparities in the volume and quality of information emerging from different parts of the country: while knowledge of the situation in and around the capital is good, information from large areas of southwest Yemen continues to be patchy (Saferworld, 2016). Under such conditions, humanitarian organisations and non-governmental organisations (NGOs) will continue to play an important role as gatherers of information and independent arbiters of data quality, but given the threats posed to their safety by ongoing fighting (*ibid.*) a functional LMIS needs to be established (Population Sector of the MoPHP, 2012). Once this is in place, staff and managers at facilities must be trained on how to collect and report inventory and consumption data, and how to appropriately manage inventory, when to re-order stock, and in which quantities (*ibid.*). Better supply chain performance will likely result from improved information systems due to the more efficient use of limited resources and improved commodity availability.

Knowledge translation hubs would assist in promoting evidence use in practice and policy: such hubs are lacking in Yemen (Saleh, 2014). Efforts should be made to update the knowledge of health practitioners when new information is released since people are able to adapt their behaviour when new information is introduced to them (Ghouth, 2013; Bashrahil, 2007; Bashrahil, 2010). It should be ensured that doctors, especially GPs, follow NMCP guidelines – in particular, avoiding prescribing antimalarial drug combinations – and more effort is needed to ensure that local drug information resources, such as national standard treatment guidelines and the national

formulary of essential drugs, are available at all health facilities (Bashrahil, 2007; Bashrahil, 2010).

It is not only health practitioners that need to be provided with updated health information, parents do to: the main reason for an unvaccinated or partially vaccinated child is largely a lack of information (Al-Rabeei, 2014). There is low immunisation coverage among children in the Al-Taizyah district, Taiz governorate, in which 69.5% of children aged 12–23 months were fully vaccinated, which is below the goal of the Expanded Programme on Immunization (EPI) in Yemen of achieving 80% vaccination coverage at district level (*ibid.*). As such, the EPI should work to raise awareness of the importance of immunisation amongst such populations. The humanitarian community also needs to be provided with important information, and efforts have already been made by the Logistics Cluster to ensure that this is the case: logistical gaps and bottlenecks are identified, and organisations are provided with updated operational information, such as port and airport status updates, and relevant procedures, as well as the publication of Situation Reports (SitReps) (Logistics Cluster, 2015).

SURVEY INSIGHTS

When asked what information systems are in place within Yemen's reproductive health sector, and whether these are working well, most respondents referred to the fact that a manual system of recording is still being used, which often does not work efficiently. These systems are supposed to collect vital data on product need, quantification, distribution, storage levels and transportation from localities so that the data can be sent up to the district level. Indeed, LMIS forms the Yemeni reproductive health workforce are supposed to use include distribution forms, storage cards, medicine application forms, and monthly reports. Three-quarters of the survey respondents were aware of these forms of LMIS. However, this crucial information is not being collected in an appropriate way, and this is where a significant part of the overall issue lies.

KEY POINTS ON INFORMATION SYSTEMS

- *Data collection is based on manual system and is inefficient.*
- *If this information was available, 66% of respondents said that it would be used to make decisions at higher levels – poor information affects the quality of decisions made.*
- *Five participants said that workers need to be trained in information systems in an ongoing way.*
- *Manual systems need to be upgraded to electronic ones and applied to all health facilities.*

Of great frustration is the fact that 66% of respondents stated that when information is available, it is always used to inform decisions at higher levels. If the information they

are receiving is incomplete and of poor quality, this is clearly impacting on the quality of the decisions leaders are able to make.

Nine survey respondents stated that reporting needs to take place on a quarterly basis, be carried out by local workers in health facilities and be sent up to the higher level. Many also highlighted that the time to carry out these reports needs to be specified so that other levels of the health sector know when reports will be received, so that delays are avoided. Five participants emphasised the need to train workers in an ongoing fashion on how to accurately complete these reports so that they are consistent and always complete.

For such a process to run smoothly, manual systems need to be upgraded to electronic ones, and seven respondents emphasised that a single electronic system should be applied to every single health facility in all localities so that all are collecting the same data and it is being processed in a consistent way.

FINANCING

Having the appropriate funds in place is crucial if any aspect of the health supply chain is to function. In the short-term, the supply of basic commodities must be maintained, requiring funds of tens, if not hundreds, of millions of dollars (Salisbury, 2011). Equally crucial is work with existing social protection funds to make sure that the country's poorest people continue to receive payments, and that, if at all possible, these payments are increased in order to take account of higher commodity prices and the risk that money transfer networks could be cut off (*ibid.*).

Ongoing fighting is felt to be a major risk in terms of the funding environment for health in Yemen, as more risk-averse donors are likely to withdraw funding (Saferworld, 2016). Combined with declining central Government contributions, Yemen's health system faces a significant funding shortfall at a time when population needs are rising rapidly and infrastructure degradation means there is an urgent need to finance reconstruction of health facilities (*ibid.*). Furthermore, the risk of misappropriation of funds ear-marked for health – in the absence of clear oversight and coordination – will be high (Saferworld, 2016).

Nevertheless, funds have been made available to drive the humanitarian response in Yemen. The Humanitarian Coordinator has approved the Yemen Humanitarian Pool Fund May Reserve Allocation of resources to the 19 highest priority projects, with a total cost of \$10 million (Dube, 2015). Furthermore, as part of the revised Yemen Humanitarian Response Plan (YHRP), WHO required a total of \$83 million for 2015, of which \$36.8 million had been received (WHO, 2015). WHO's response to the crisis in Yemen has been supported by the governments of Japan, Finland, the Kingdom of Saudi Arabia, the Central Emergency Response Fund and the Office of US Foreign Disaster Assistance (OFDA) (*ibid.*). However, this amount of funding is still not enough and it is rather short-sighted in its approach. What is needed is for a long-term

approach to financial management and planning for all sectors and levels of the health supply chain to be developed (Patykewich et al., 2007).

SURVEY INSIGHTS

The issue of financing underlies all the other problems listed in relation to Yemen's reproductive health system: clearly, there is a real lack of available funds. This is partly caused by the fact that there is limited, or no, MoH budget allocated to health supply chain activities. Exactly half of all respondents said that there was no budget allocated at all by the MoH, while 49% answered that they did not know if there was. As such, the need for donor support is vital.

Several respondents championed the continuous financial and technical support provided by donors, which is something many parts of the health system have come to rely on. In particular, donors are providing money in the absence of any funds provided by the MoH, making their financial involvement vital. Alongside financial and technical support, donors are also said to offer services of supervision, evaluation, materials and training, meaning that if donor money ceases, almost every aspect of the reproductive health system will fail, as several respondents warned.

Some participants stated that donors have become part of the national strategy, although as much of the data collected in this study suggests, such a strategy simply does not exist. Donors are filling a void (and national leaders are depending on this), rather than working out a strategy for how to stand on their own two feet and provide the services themselves.

Donors themselves did actually receive some criticism from respondents in this survey, with disapproval being directed at a lack of donor transparency and a tendency



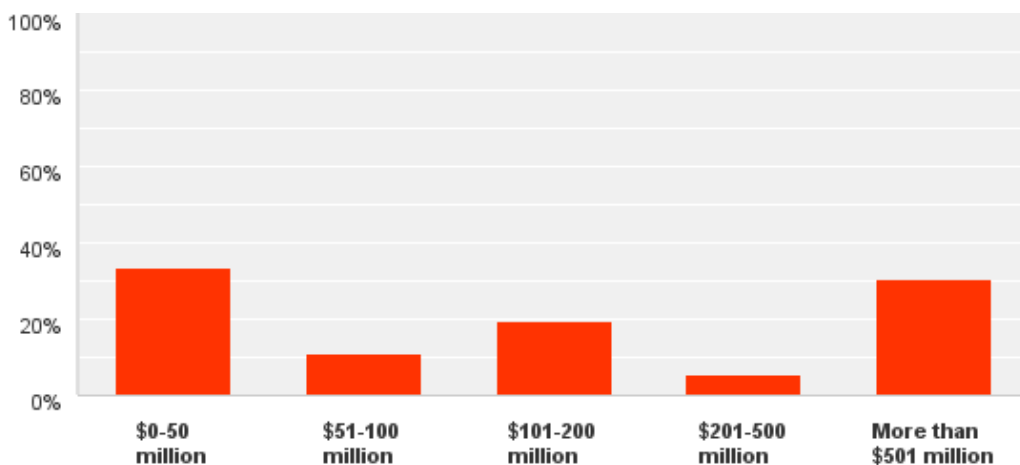
KEY POINTS ON FINANCING

- *Half of all respondents said that there was **no budget allocated at all by the MoH.***
- ***Donor funds are therefore vital.** Donors also offer services of supervision, evaluation, materials and training.*
- *Donors are filling a void (and national leaders are depending on this), rather than working out a strategy for how to stand on their own two feet and provide the services themselves.*
- *Donors themselves did actually receive some criticism, with disapproval being directed at a lack of donor transparency and a tendency for donors to provide assistance in projects and areas which support their own overall goals.*

for donors to provide assistance in projects and areas which support their own overall goals, rather than working for the greater good of the system. This means that certain groups, localities and aspects of the reproductive health system miss out on funding, and coordination between the actions of donors and reproductive health institutions is generally lacking.

When asked how much money will be needed if the reproductive health system is to improve, responses varied (see figure below). A third of respondents thought that the lowest estimate of \$0–50 million was needed to make the necessary changes, whilst the maximum option of more than \$501 million received

just one less vote, with 31% of respondents referring to this figure in total. Perhaps the complexity of Yemen’s political situation and its troubled reproductive health system has made it difficult for individuals working within it to estimate such significant costs. Work needs to be done at the national level, likely with external assistance, to accurately forecast the funds needed if changes are going to start being made.



How much money will be needed if the reproductive health system is to improve?

The question of where this money should come from was also put to participants, and just over half listed both the national Government and international organisations/donors jointly. The rest listed just international organisations as the suggested source of finances, although they stated that it is necessary that the Government and external agencies coordinate to ensure that funds are sustainable and long term. Planning and commitment from all parties is necessary, and the completion of ongoing needs assessments, including speaking to service users, was said by several respondents to be essential. Only once a proper funding system has been established in the short term can the Government work towards achieving the long-term goal of being financially independent and secure.

THE PRIVATE SECTOR

SURVEY INSIGHTS

The scale of the health challenge in Yemen, and the extent of the humanitarian crisis, has already led to the international community relying on private sector actor involvement to get vital products to those most in need. Indeed, the survey used in this study concluded by asking respondents whether or not they believed the private sector has a role to play in improving Yemen's reproductive health system in the coming years, and over 70% of participants answered yes.

Several participants praised the current actions of the private sector in Yemen: they have been responsible for offering relief and health supplies in the absence of ministry action and input. However, nine respondents also emphasised the importance of continuous cooperation and coordination with the Government when it comes to moving forward and improving the overall reproductive health system, suggesting that private sector involvement cannot be relied upon alone.

Nevertheless, where private actors can play a particularly positive role includes their ability to provide vital training to the health workforce and to also follow it up with supervision, as stated by four respondents. Raising awareness internationally of the reproductive health needs in Yemen is another role the private sector could play,

according to three participants, and one also added that reproductive health education amongst the population is a further need which could be met by private sector actors. As has already been discussed in this analysis, data are crucial if stock levels are to be kept up, facilities are to coordinate with one another and performance is to be monitored and improved. This is a void that three respondents said private actors could fill. Finally, having enough reproductive health supplies to meet the need is something private sector actors can address as they have the capacity to buy commodities at low prices and can choose to sell them on in the market at similarly low prices, as two participants mentioned. The benefits of such involvement are clearly abundant and so the Government needs to implement policies and establish agreements that commit to a joint programme of work and commitment to improvement.

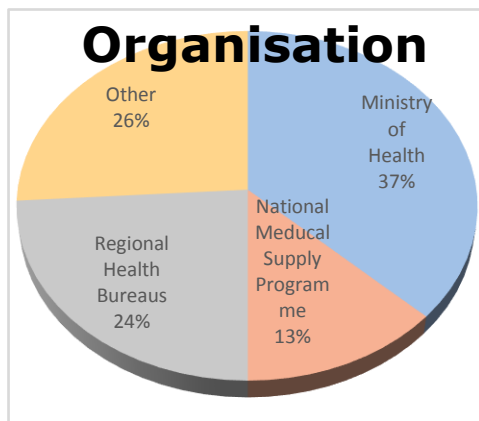
KEY POINTS ON THE PRIVATE SECTOR

- *70% of participants believe that the **private sector has a role to play** in improving Yemen's reproductive health system.*
- *Several respondents praised current actions of the private sector as they have been responsible for **offering emergency relief** in the absence of ministry action.*
- *The private sector can provide training and supervision, raise awareness internationally, provide reproductive health education for the population, buy commodities cheaply and sell them on to the market at low prices.*
- *Government need to implement policies and establish agreements that commit to **a joint programme of work**.*

COMPETENCE ASSESSMENT

The competence assessment was conducted as part of a needs assessment project for the MoH staff working in supply chains. The majority of respondents come from Sana'a governorate and the capital city of Sana'a. Other towns included Dhamar, Sa'dah, Hajjah and Sayun. Nearly 58% of respondents work in district departments and nearly 37% at the central MoPHP.

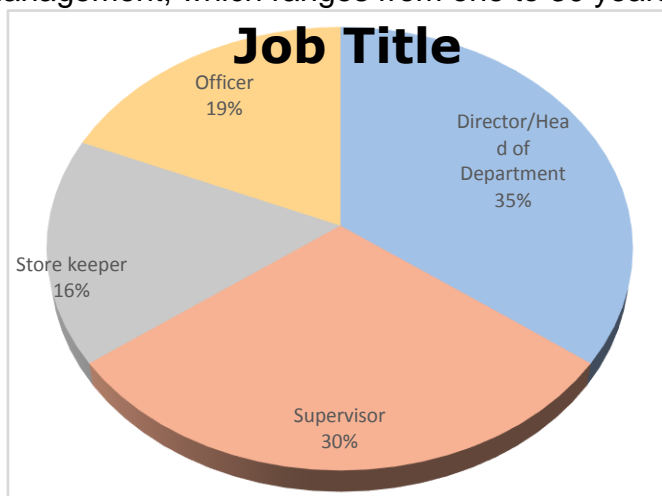
Other institutions include regional health bureaus (24%), the National Programme for the Supply Chain (13%), mother and child hospitals, health centres and NGOs (26%).



The youngest respondent is 26 years old and the oldest is 58. On average, many respondents are 40 years of age or under (58%), male (59%), hold a bachelor's degree in sciences or pharmacy (52%), a diploma (29%) or a master's degree (17%), have more than 10 years of general working experience (59%) and have over five years of experience in the current position (71%). The expertise of the majority of respondents lies in the field of community nursing and related areas (e.g. maternal and child health, women's diseases

etc.) with the rest of the respondents specialising in pharmacy and other public health areas.

Most respondents represent the top management of their respective organisations – directors of national programmes or heads of health departments (34%). Nearly 29% supervise the reproductive health programmes and hold other managerial positions, and 16% of respondents work as store-keepers. 18% of respondents are technical, supply and programme officers. Over three-quarters have experience in supply chain management, which ranges from one to 30 years, and on average is 11 years.



The survey collected data related to decision-making about appropriate selection of medical products, quantification, procurement, storage and distribution, rational use of medicines, resource management and professional management. The respondents were requested to assess the importance of these professional responsibilities and to

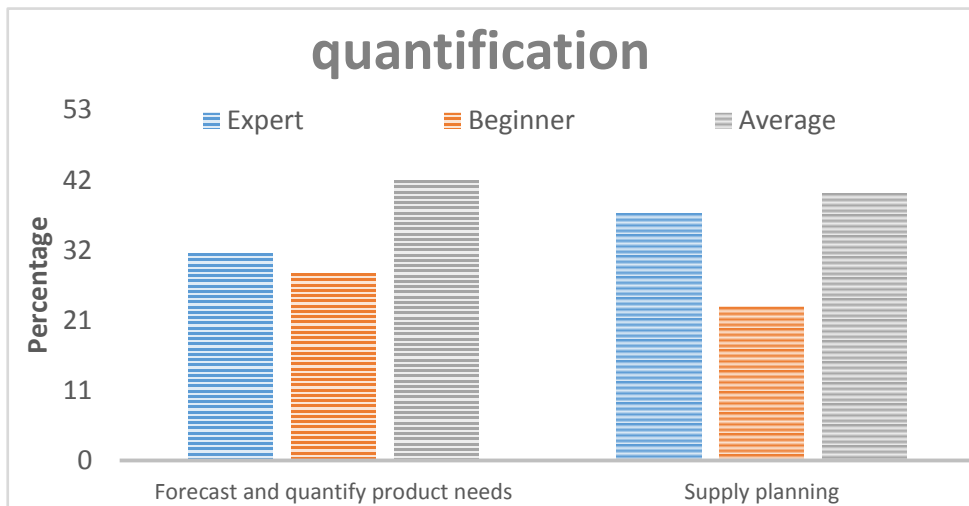
assess the level of their own experience in dealing with these daily tasks.

In relation to the process of the initial selection of medical products, respondents specified that they envisaged their main responsibility to be defining the specifications and quality of the product.



Over half of respondents indicated having expert knowledge and skills in this area, with 25% stating they only have entry level skills. When it comes to more specific skills, for instance identifying special storage conditions for certain products or arranging them by size and implications for infrastructure, the confidence in respondents' expertise drops down to 29%. Overall, although nearly 45% of respondents indicated having a high proficiency in selecting appropriate products for procurement, almost 28% still expressed reservations about their knowledge of this process.

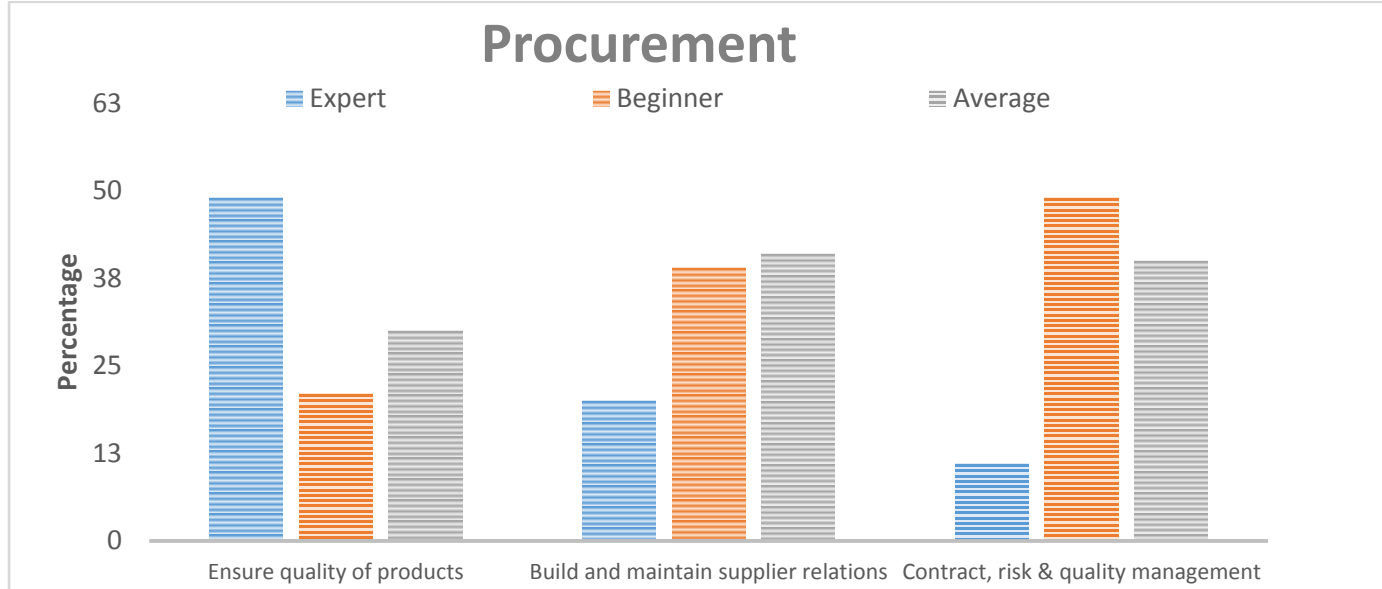
At the stage of quantifying product needs and supply planning, a similar picture is observed.



On average, only 34% of respondents feel entirely confident in their professional skills in quantification. A quarter of respondents would still indicate only having basic knowledge and skills in this area.

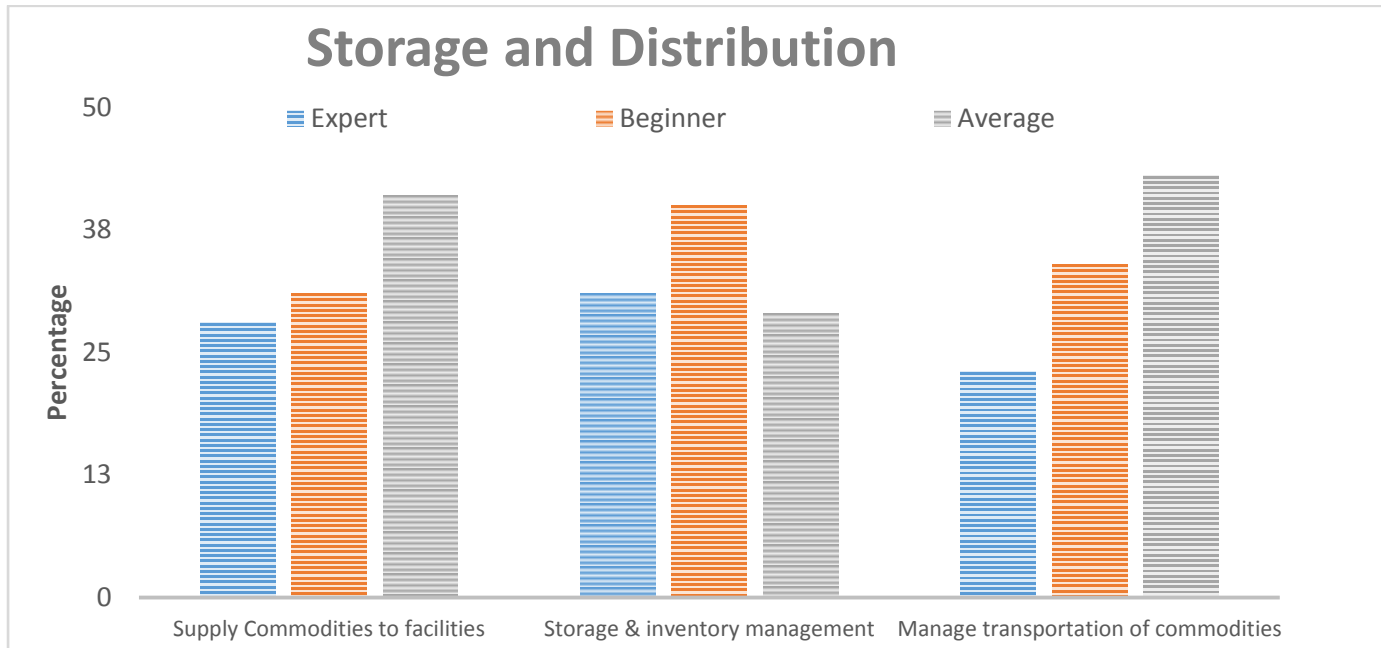
As far as procurement operations are concerned, respondents highlighted that their strongest knowledge lay in processes related to ensuring the quality of products and

managing import and export. However, the respondents are not sufficiently familiar with such important areas as building and maintaining supplier relationships, managing tendering processes and supplier agreements, and contract management (with risk and quality assessment).



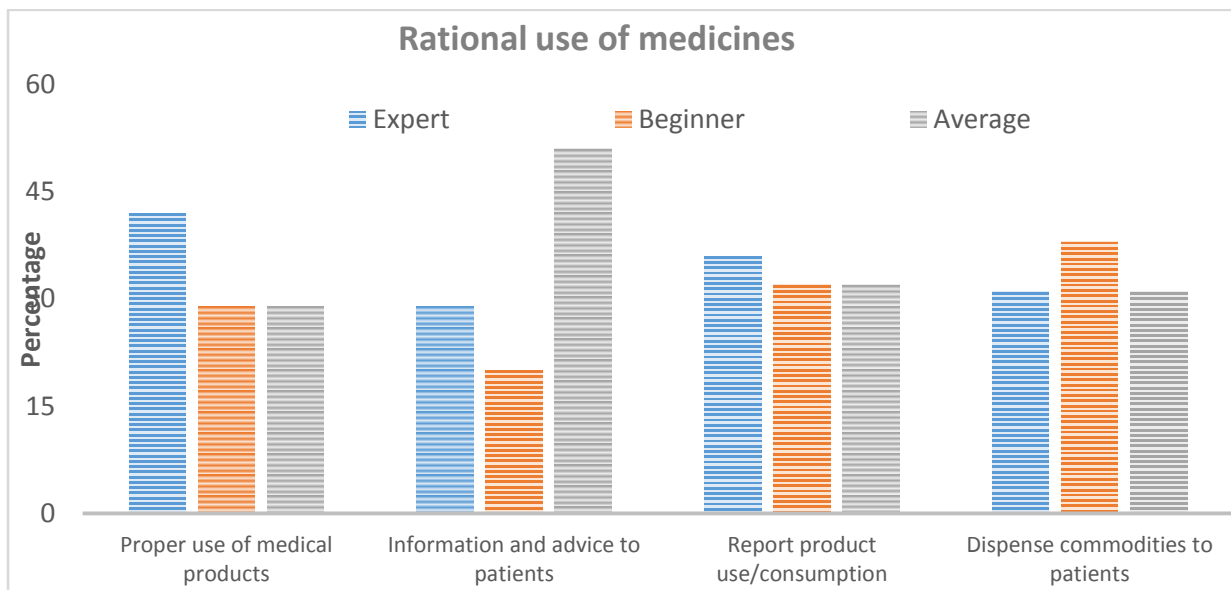
For instance, as few as 12% of respondents describe themselves as experts in risk and quality management, and less than 15% indicate having excellent skills in managing supplier agreements. Even regarding the process of ensuring the quality of products, 21% of respondents still express doubts about the strength of their knowledge.

The set of questions related to storage and distribution further complicates the picture and highlights an interesting functional dependency between the level of professional competency and the level of respondents' expertise. Particularly in this section of the survey it becomes more evident that the higher the importance of a competency for the respondents' work, the less confident they feel about the quality of their skills and knowledge. For example, storage, warehousing and inventory management are identified as the most important competencies, and the lack of expertise among the respondents in this area reaches 40%.



Regarding two other essential procedures, managing transport for commodities and supplying commodities to facilities and sections within facilities, an average 31% of respondents are barely familiar with these procedures. The procedure of managing expired, damaging or redundant medicines and their safe disposal is also scarcely known to nearly 29% of the survey respondents.

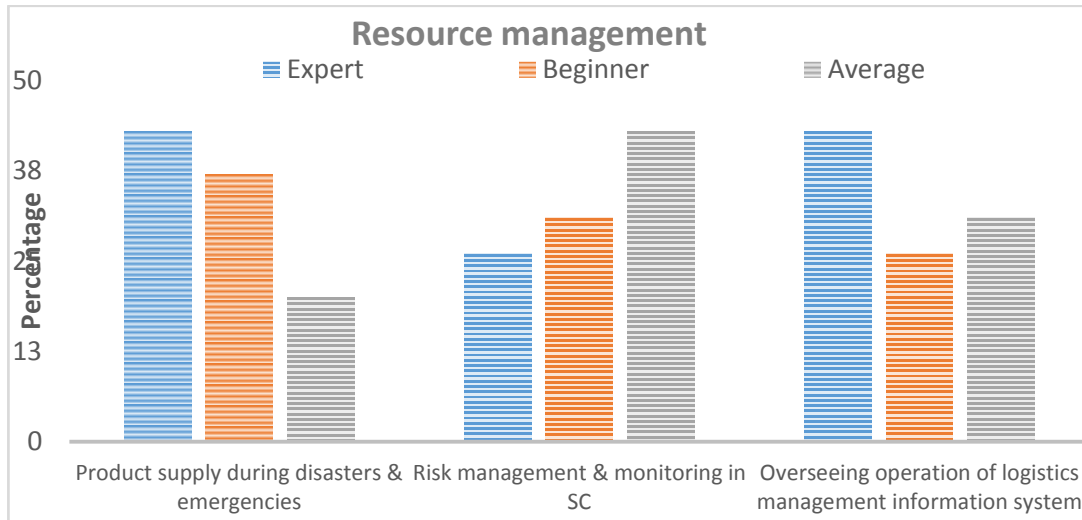
As far as the rational use of medicines is concerned, the respondents report having a high level of expertise (overall 72%) in the most important competency of properly using medical products according to international or national regulations (safety, dispensing protocols, testing guidelines etc.).



Equally important, the process of providing information and advice to patients on product use is very familiar to nearly 80% of respondents. However, the procedures

of reporting product consumption and dispensing commodities to patients are only superficially known to nearly 35% of respondents.

Questions related to resource management demonstrate another gap in the respondents' expertise and emphasise the functional dependency between competencies and expertise indicated earlier.



In regard to such essential operations as preparing for product supply during disasters and emergencies, while 63% of respondents are very familiar with these operations, 37% are equipped with only the bare minimum of skills in these areas. Only 25% of respondents indicate having expert knowledge in risk management, monitoring and evaluation activities for supply chains. Again, 47% of respondents indicate having only basic expertise in managing and planning supply chain projects. Overseeing operations of logistics management and information systems is another area where a quarter of respondents have deficient knowledge.

The final section of the questionnaire is dedicated to the exploration of the professional and personal development of the respondents.



They identify their skills as being the highest in communication (91%) and problem-solving (88%). Also, 80% of respondents estimate their leadership abilities as being well developed. On the other hand, 31% highlight only having a superficial understanding of professional and ethical values and the legislative framework in their area.

Based on the survey results, it might be concluded that high-level managers and leaders in supply chain with considerable working experience and many years in office still believe there are important competency issues in almost every area of the health supply chain. Between 20% and 48% of respondents highlight having a lack of expert knowledge in procurement, storage and distribution, the rational use of medicines and resource management. The level of professional skills is estimated to be higher in the areas related to product selection and quantification, but still nearly a quarter of respondents recognise gaps in their competency. At the level of professional and personal development, respondents assess themselves most favourably, indicating higher levels of proficiency in communication and problem-solving. Nevertheless, such important aspects as professional ethics, understanding and abiding by the legislative framework remain largely a grey area for over 30% of respondents. Even in relation to generic skills (e.g. literacy, numeracy, technology etc.), 40% of respondents highlight the necessity for improvement.

OUTCOMES FROM THE WORKSHOP

FORECASTING

Forecasting means the quantification of national needs and translation of these requirements into a procurement plan by linking information on services and commodities from the facility level with programme policies and plans at the state level.

Forecasting demand for supplies and services is the foundation of a well-functioning supply chain. This is the process that creates the information that drives all other decisions. These decisions include what to procure; when and where to procure; where, how and in what quantities to store supplies; how to transport, where to and how often; how to allocate responsibilities in the supply chain; and what human resources and skill sets are needed.

Forecasting for reproductive health commodities in Yemen is done by the MoH in Sana'a, although details of the team devoted to forecasting remain unknown, as does their location in the MoH structure. Some insights arising from the workshop are summarised below:

1. Forecasting is not done at governorate, district or health facility level.
2. The forecasting software is dated, as are the PCs where it is installed.
3. The forecasts are very basic, being formulated using a model based on a generic algorithm of population, age profile and likely usage of reproductive health commodities.
4. The forecasts are updated once a year by simply increasing the previous year's forecast by a fixed percentage.

There is plenty of room for improvement in this state of affairs in terms of data used for forecasting activities, forecasting tools, and forecasting for decision-making.

FORECASTING DATA BASED ON ACTUAL CONSUMPTION

Firstly, and most fundamentally, there is a need to move towards a system of forecasting based on actual usage of commodities by the population of Yemen. Data collection at facility level proves complex in many countries, and it is even more complicated in a war-torn country. However, the spread of mobile technology provides a reliable tool to provide data on consumption levels from the health facilities on a regular and frequent basis. This could be as simple as sending text messages from

facilities quantifying consumption. The mobile phone network in the country is largely operating and it is not technically difficult to create a database of consumption based on a template SMS report from each facility. For instance, the World Food Programme has used SMS messages to build a database of the prices of different food types in different markets in countries in west Africa. A similar system in Yemen would show which commodities, in which quantities, are being dispensed, and where. Using such an SMS system does not require substantial training, nor does it demand large outlays of capital to provide the phones and mobile phone service provider charges. Furthermore, unlike a paper-based system, the data provided are immediately available to supply chain forecasters and planners. Such a system is not overly subject to data inaccuracy compared to the current method in Yemen of lists of commodities dispensed being collated into reports – with transcription errors – for passing back up the supply management chain. In fact, it is very likely that most of the current manually intensive reports of commodity dispensing are not used to manage the supply chain at the moment at all.

This shift to a beneficiary-focused forecasting approach opens the door to many opportunities: most important of all, allowing supply chain professionals to know what supplies are being used and where based on actual consumption data. The use of real data driven by beneficiary consumption would dramatically increase the accuracy of forecasting compared with the current method. Armed with these accurate data, decisions can be made about allocation of supplies, timing of deliveries, storage facility needs and locations. In addition, the data can provide an early view of procurement needs.

It is not known at the moment if such a technological system could be created using the skills and experience that exist in Yemen. However, this is certainly worth exploring as this kind of system is based on a straightforward set of data, such as location, date, commodity reference, and quantity dispensed. It seems possible that the skills and experience may exist to translate these SMS data into simple spreadsheet-like databases, which can be used by supply chain planners and forecasters. Even if the technological options are extremely low, when compared with the absence of real forecasting data coming up from the front-line, which is the current situation, this is a line of enquiry that should be included in the supply chain strategy. Even if the understanding reached in the workshops about the mobile phone network coverage in Yemen is incorrect, or the costs are prohibitive, it is vital to improve the accuracy of forecasting by actual consumption levels. The first place to look for this consumption information is the use of electronic, mobile data rather than paper-based systems, which are labour intensive and subject to large inaccuracies.

UPGRADING HARDWARE AND SOFTWARE USED FOR FORECASTING AT MOH LEVEL

The second area for improvement in the current forecasting process is to upgrade the hardware and software being used by the MoH. PSA does not have any information about the system being used but feedback from participants indicate that the system

is out of date. To start with, a PC-based spreadsheet and databases could prove more effective in the short and medium terms, prior to the introduction of more complex software. The combination of data coming up from the front-line and good software and equipment to manage the data may well reveal a number of immediate quick wins for the supply chain in terms of both efficiency and effectiveness. Examples include potential regional, quantified variations in the update of different contraceptive methods, allowing for different patterns of allocation to governorates and districts, thus reducing wastage and improving the likelihood of providing what the local population wants. Another example would be where transport to facilities is blocked for periods of time, when the route re-opens a delivery can be made that reflects actual consumption data before the disruption, ensuring that the space in trucks is taken up with what is actually needed.

MORE SOPHISTICATED SOFT, TECHNICAL AND DECISION-MAKING SKILLS FOR PROCUREMENT

As data become more accurate and the forecasting software more suitable, the decision-making process of forecasters, planners, and managers, through the use of actual data and more appropriate software, can become more sophisticated. In order for this to happen, decision-makers should be exposed to more challenging approaches to strategise in regard to forecasting and planning, to move from a merely passive role – as has happened until now. Dedicated training, or participation in an open course with peers from other developing countries, is suggested.

In summary, improvements in forecasting based on accurate, technologically enabled, consumption data is an area of great potential for improving the supply chain for reproductive health commodities in Yemen.

PROCUREMENT

Procurement is the process of the acquisition of required medicines, which is usually one of the last expenditures in the national health budget.

The workshops touched on the process of specifying reproductive health commodities and its challenges, identified as being the length of time it can take to create specifications for locally procured items and the difficulties in getting specifications that are suited to Yemen for internationally procured items. The supply chain process is

going to start from the point at which the items are specified and the issues have been overcome or are going to have to be dealt with by medical staff at point of delivery.

The Yemeni reproductive supply chain can count on local procurement, in terms of medicines, equipment, or services. However, the vast majority of reproductive health commodities used in the Yemen MoH are reported to be procured from international suppliers and imported into the country.

Part of the reason for the preponderance of international procurement is that funding from international donors and UN agencies to the MoH to procure from local suppliers has stopped flowing because the local procurement process is complicated.

For UN agencies such as the UNFPA, it is extremely time-consuming to undertake local procurement due to specification complexity as well as complicated procurement procedures amplified by a shortage of staff to undertake the work demanded: for example, market analysis and getting suppliers onto the approved UN vendors list. In the case of the UNFPA, it is reported that where the procurement value is more than \$10,000, international procurement from UNFPA Supply is mandatory.

Moreover, the pricing system has created failures in the local market. In fact, donors and UN agencies are offered a substantially higher price by local suppliers than is offered to the MoH.

From a supply chain point of view, there are some clear actions that could be taken to mitigate these challenges and failures.

PROCEDURES IN SUPPORT OF LOCAL PROCUREMENT

Procedures tailored to support local procurement can be created and implemented, based on best practices adopted by other NGOs and other organisations to reduce the risks of fraud and high pricing. Crucially, they also provide a mechanism to grow the local supply base.

DEVELOP COMPETENCIES OF STAFF DEVOTED TO PROCUREMENT

Even with redefined local procurement procedures, the ability to achieve good prices and low levels of fraud is dependent upon having a competent and supported team of professional in place in sufficient numbers to undertake such procurement. Typically, it requires a team including a full-time Programme Specialist to help with speeding up and clarifying specifications, at least one full-time Procurement Officer, and a Procurement Specialist, with the objective of understanding the local suppliers and market so as to address issues around pricing and cartels.

LOCAL MARKET ANALYSIS

It is advisable for UNFPA and the MoH to undertake a comprehensive and continuous analysis of the local market in terms of availability of suppliers and level of competition. Also, a comparison of the cost of having teams dedicated to local procurement as

against international procurement should be carried out in order to obtain a precise picture and to identify the opportunity costs of the options.

In summary, the options for making improvements in procurement in the Yemen reproductive health supply chain lie almost entirely in making changes to procedures, capability strengthening, and having sufficient resources to undertake the task.

IMPORTING

A significant portion of medicines in Yemen are procured internationally and the process of importing has proven to be hindering the efficiency of the logistics flow.

PSA understands that the vast majority of reproductive health supplies are imported into Yemen by sea. Insights from participants established that procedures for unloading supplies off an arriving ship are lengthy. This seems to be largely down to issues around clearance and moving supplies out of the port. The UNFPA has increased its resources in Djibouti to facilitate this process and they rely on a clearing agent. However, details shared were minimal and hence no further comments are possible. It was raised in the workshop that the UNFPA used to allow the MoH to deal with clearance but this is no longer the case and it is unclear if this shift has caused any impact on transit time. It is well known that in some ports in west Africa it can take up to six weeks to get a berth. Whilst not wanting to downplay this issue, it is worth noting the long lead time can be incorporated into the forecasting, procurement, and storage plans if the issue of the port lead time cannot be resolved in the short term.

In summary, it appears that the supply chain strategy should focus on areas other than importing since this is a known time delay that can be planned for; UNFPA have put a Logistics Manager into Djibouti to address the issue as much as possible. Delays in importing are a widespread issue internationally and this issue probably does not merit the expending of precious time and resources when Yemen has other areas where improvements to the supply chain can be addressed.

WAREHOUSING

Warehousing means all the activities of storing medicines at different levels (governorate, district, etc.)

There are three warehouses used for reproductive health commodities by the MoH in Sana'a at the moment. The UNFPA has provided funds to secure one of them. It is understood that the main warehouse is in need of repair to some extent.

There are storage facilities at governorate level as well as at district and health facility level. Some of these may be extremely small. There are also some regional-level warehouses as part of a project funded by the Government of the Netherlands. There is no consolidated view of inventory in the supply chain system as far as PSA understand it.

On the basis that procurement issues are being addressed through training, resourcing and procedures, and forecasting issues are being addressed through accurate consumption data, training and technology, inventory management provides a crucial tool to improve effectiveness and efficiency. It was pointed out by workshop participants in Group B that it was common for drugs to arrive at a hospital and not be delivered to the wards. It is possible that this is happening at every stage in the delivery/storage process as there is no evidence to disprove it. Without good inventory information, this cannot be quantified and addressed.

If good inventory information becomes available, it will be possible for decisions to be made about the overall storage strategy in the Yemen reproductive health system, such as, for example, the role of the regional warehouses. Good inventory information combined with good data about beneficiary consumption creates opportunities to identify systematic issues of leakage in parts of the supply chain, allowing targeted activities to reveal such issues and deal with them.

In summary, the lack of information about inventory at multiple levels in the supply chain is a fundamental building block to driving not only efficient customer service but also reducing storage and leakage costs.

DISTRIBUTION

In the context of the workshops, distribution is defined as delivery to the next point in the supply chain, ending with the health facilities. It does not include dispensing to beneficiaries

Once every six months there is a distribution from the central warehouses to the governorates. Once every three months there is a distribution from the governorates to the districts. It is not clear how health facilities receive their distributions from the districts and how out-of-date medicines are disposed of. An idea for improvement raised in the workshops was for health facilities to bring commodities back when they visit the districts to collect staff salaries.

The workshops revealed that the governorates no longer have funds to undertake their distributions. Given that it also was shared that many staff in the Yemen health system have not been paid in three months, it seems likely that districts do not have funds for distributions either – nor, presumably, salaries for the health facilities.

Faced with evidence that there are no funds for distribution beyond the governorates, PSA would ordinarily suggest investigating classical supply chain strategies: for example, looking at the cost/benefit of more frequent distributions or using the private sector. However, this is tragically theoretical given the circumstances. However, more frequent distributions (with the implied reduction in storage space and costs) were discussed and found not to be favourable due to the fact that distributions from the central warehouse to governorates includes a health promotion team, so the activity went further than simply shipping goods. Similarly, discussions about using the private sector in the distributions from the governorates naturally flounder in the face of there being no funds to pay the transporters – not that there is any evidence that private sector trucking would be cheaper than using MoH or governorate trucks.

In summary, combined with improved forecasting, inventory visibility and consideration regarding which storage facilities are made use of, potentially including regional warehouses, it may well be that there are improvements to distribution that can be made but that are not clear at the moment, due to lack of data.

FUNDING

In the context of the workshops, funding was defined as the financing of the reproductive health supply chains for each function (procurement, distribution, transport, etc.)

One of the main challenges identified from the results of the survey is the fundamental lack of available and allocated funding at every level and function of the reproductive health supply chain. Availability of funding is a proxy for the implementation of a supply chain strategy, hence it deserves close consideration. Funds appear to have been withdrawn from the MoH, which has no visibility on funds spent by donors such as the World Bank or UN agencies such as UNFPA and UNICEF. There are some concerns about chains of donors and agencies, and about the administration fees allocated to them from project costs.

Transparency over costs and available funding is a medium- to long-term goal that is overarching the supply chain strategy as a proxy. It does not fall strictly into the strategy definition; however, it is essential for strategy implementation.

YEMEN'S HEALTH SUPPLY CHAIN STRUCTURE

Yemen's health supply chain comprises a number of different actors and parallel supply chains.

The workshops did not go into great detail about the various organisations involved in the supply chain due to the short time-scale and the focus on process issues.

There are around 2,000 staff in the Yemen health supply chain, including 46 trainers (who completed the survey). There are around 3,000 health facilities, 331 districts and 22 governorates. There are separate sectors within the MoH, such as Reproductive Health, Curative Health, etc.

There is a Public Health Technical Working Group dealing primarily with programme issues. Attached to this Working Group there is a Logistics Committee, with terms of reference and job descriptions. Group A agreed that one quick win would be to resurrect this Logistics Committee, since it has recently stopped meeting.

During the workshop, it was difficult to identify a clear line of responsibility and accountability. It is possible the topic was overlooked due to time constraints, however this is an essential condition in order for responsibilities to be very clearly spelled out, so as to implement the supply chain strategy effectively.

SUMMARY

It is paramount to deepen the knowledge of the Yemen reproductive health supply chain by enabling an expert or group of experts to drill down further and look more widely into the details of the supply chain. PSA have done their best on the basis of a desk review and an excellent response to the survey and the very useful three-day, multi-group workshop, but more needs to be learnt (or shared), whether by in-country MoH resources or an external party.

SUMMARY OF NEEDS

The main issues that can be drawn from the needs and competency assessments, and from the workshop, are listed below:

- Transport and infrastructure: More funds need to be made available for transport and strong leadership is essential if the approach to transportation is to be coordinated.
- Distribution: Continuous provision of supplies persists as a problem and a coordinated system to transport commodities across the system has yet to be put in place. Urgently seek funding for distribution from the governorates and districts to health facilities with a view to getting commodities to the people in need.
- Inventories: Investigate the viability of creating a 'quick and dirty' snap-shot of inventory in the various storage locations with a view to identifying issues in the flow of commodities. Investigate how similar health supply chains reduce 'leakages'.
- Warehousing: national guidelines for warehousing would help.
- Quantification and planning: There is a lack of a budget for buying commodities and for supervising the process and distributing items. There is a need for cooperation within the entire Yemeni medical system.
- Procurement: The main procurement challenge was the lack of a specific budget set aside for it, and the distorted market conditions for local procurement. There is a need to investigate whether local procurement procedures for exceptional circumstances can be developed by the MoH and UNFPA.
- Workforce: Reproductive health workers are generally lacking in numbers and distribution is poor. Training appears to be vital at all levels on a continuous basis to keep competencies stable along the chain over time.
- Information systems:
 - i) A manual system of recording is still being used, which is often inefficient, and data are not consistently passed upwards along the chain for informed decision-making.
 - ii) There is a need to investigate the level of IT and mobile technology capacity skills in the MoH and in Yemen as a whole, with a view to understanding whether a home-grown SMS-based consumption forecasting solution could be created.

- iii) There is a need to investigate how mobile data solutions are being used in other sectors of the public health system: for example, in vaccinations data gathering, with a view to 'piggy backing' on existing technology solutions.
- Supply chain management: the chain of command and lines of responsibility in the supply chain should be created or clarified, and the Logistics Committee attached to the Public Health Working Group should be resurrected.
- Financing: The issue of financing underlies all the other problems listed in relation to Yemen's reproductive health system; clearly, there is a real lack of available funds.
- Private sector: the private sector has great potential but specific policies are required to allow for coordination.

A FIVE-YEAR STRATEGY FOR THE YEMEN REPRODUCTIVE HEALTH SUPPLY CHAIN

This section includes the main areas of the strategy which were discussed. These can be broken down into four main themes:

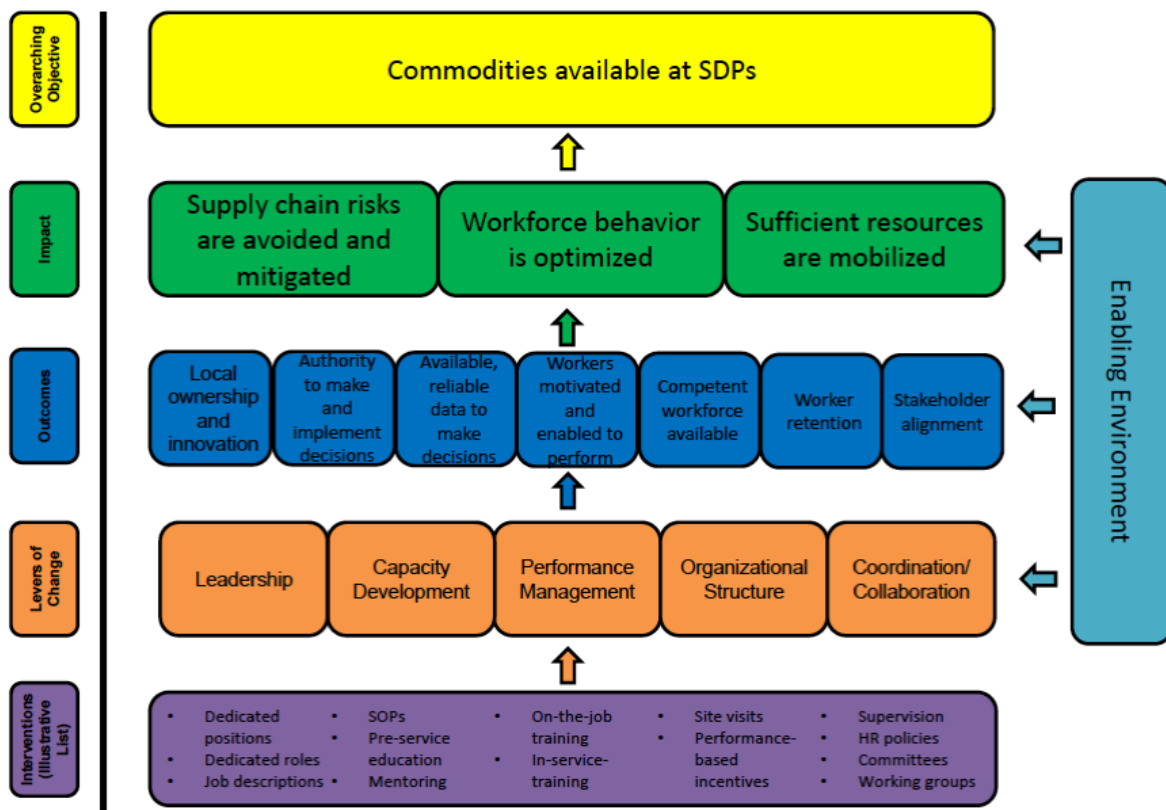
- Capacity building.
- A national procurement agency.
- A technology/IT development road map.
- Renovation of structures and equipment.

CAPACITY BUILDING

The survey highlighted the lack of supervision in the supply chain, combined with a belief on the part of the participants that they did not have the skills to manage a supply chain. The workshops revealed that there is no procedures manual for supply chain staff to refer to. These three areas (procedures, skills, supervision) are central to the supply chain strategy.

Many excellent ideas were developed in the workshops, by both groups. However, PSA's experience is that capacity building must be thought of holistically using a structured approach and methodology so as to avoid a lot of activity with little impact. This structured approach would be through the use of a theory of change (Gerdes and PSA, 2016)

The theory of change ensures that inputs are correctly positioned, sequenced and supported so as to be successful and sustainable. The theory of change ensures that all aspects of capacity building are included in the planning and delivery of capacity building.



USAID| DELIVER Theory of Change Model for Investments in Human Resources in Supply Chain Management

Purple boxes refer to interventions, or specific activities or policies that are implemented. These are tangible actions that are often funded by outside donors, but that might be co-founded or fully funded by ministries in partner countries.

Orange boxes are organisational levers of change. These levers of change are the most critical foundations of the theory of change. A functional human resources system relies on all six of these areas. Multiple interventions may lead to improvements in these areas, and improvements in these areas may set off multiple chains of positive outcomes and impacts, but these areas are the core of human resources for supply chain management investments. Investments that contribute to these boxes set off a cascade of outcomes.

Blue boxes are direct outcomes of successes achieved by influencing the levers of change. These are often necessary short-term steps that are concrete. Together, these outcomes lead to an enabling environment in which supply chain workers can perform. It is important to note that a combination of outcomes is required to achieve any given impact; this is a non-linear path. This issue is one of the key reasons why evaluability of the types of interventions referenced is such a nuanced and complex challenge.

Green boxes indicate the impacts of the previous chains. These impacts are results- and impact-based. The impacts listed are not comprehensive, but are rather the key impacts that seem to hold the most significance in the theory of change cascade as it is currently understood.

The **yellow box** is the overarching objective of the project: having high quality commodities available at service delivery points in appropriate quantities to meet need. There will be numerous pathways to get to this overarching objective and myriad other impacts that contribute to the overarching objective that are not depicted in this specific theory of change framework.

PSA believe that using the theory of change will not only ensure that capacity building is successful but it may also be



Examples of the activities that would fall within the theory of change are:

- *the creation of a supply chain procedures manual*
- *training staff on the supply chain procedures manual*
- *where current procedures are satisfactory, strengthening understanding of them through training*

a way to bring USAID into a working relationship with UNFPA to support the strengthening of human resources for the Yemen reproductive health supply chain.

On-the-job training is a predominant feature of capacity and skills building. This practical, real world, non-

workshop training is extremely effective. The fact that supply chain training has been provided in Yemen in recent years but the survey shows that most participants do not feel that they have the necessary skills points to a need to change the training approach.

Training can be conceived in three different ways: firstly, in-country training for all staff; secondly, trainer of trainers training; thirdly, out-of-country training in countries such as Kenya or Nigeria, where there is a functioning health supply chain.

Other suggestions regarding training are:

- incorporating supply chain training into the career development path within the MoH, as well as in the wider Yemen health sector;
- creating a supply chain management master's degree at a university in Yemen, as has been done in Ethiopia and Rwanda;
- incorporating elements of supply chain training into existing courses for health professionals in Yemen: for example, stock room management for midwives and nurses; and

- including internships in the master's degrees and diplomas created in Yemen's education system so that students can experience a functioning supply chain in practice.

A NATIONAL PROCUREMENT AGENCY

There used to be a very successful Drug Fund in Yemen. This should be re-instated and consideration should be given to expanding its role to take into account the excellent results delivered by such parastatal bodies in Kenya, Sudan and in Kaduna State in Nigeria.

Whilst understanding that diplomatic relations between Yemen and Sudan are not good at the moment, PSA feels obliged to describe the outstanding success of the Sudan parastatal structure. This structure was seed-funded initially and it then became a profit-making entity, with a staff of 400. A policy stipulates that all states procure centrally from this entity. This has also led to the growth of the Sudanese manufacturing sector to such an extent that Sudan is now an exporter of medicines.

Another example is Kenya where the Central Medical Store, a parastatal entity, began its national supply chain transformation in 2013, led by a CEO from Pfizer, and is now so successful that it procures on behalf of UN organisations and NGOs.

In Kaduna State, Nigeria, a state central procurement agency is being piloted which involves health facilities coming to the agency warehouses for their medical supplies.

PSA understands that a project to reinstate the Yemen Drug Fund was initiated with support from the Government of the Netherlands. It was described in the workshops as successful at the start but it eventually failed due to resistance from local manufacturers. Any effort to try again must resolve this problem by understanding how to remove these barriers effectively. It appears to PSA that where there is a political will, combined with good practices and effective supply chain management, this can be done – as has been the case in nearby countries.

Whilst re-instating the Drug Fund is a good idea in order to address procurement and funding, there are also options to consider as part of this re-instatement:

- 1) The creation of one national health supply chain organisation in Yemen, with a responsibility that goes beyond reproductive health to cover all health sectors and beyond procurement to include distribution, forecasting, specifications, and using the private sector for some areas of service delivery (for example, some local manufacturers have very good distribution systems).
- 2) A national health supply chain system can make use of storage facilities in other parts of the supply chain: for example, with a system of internal profit-making, Governorates could supply neighbouring governorates that are located in conflict zones. If there is a solid set of supply chain procedures, with a growing competency

and skill set, the key element to this sort of imaginative use of the physical assets in the supply chain is a risk/reward system that encourages innovation. Similarly, with the right set of conditions, distribution from districts to health facilities, or even between health facilities, could be created in accordance with market rules that are created internally to Yemen. The same potential exists for the regional warehouses previously created in the last effort to recreate the Drug Fund.

In PSA's view, creating improved supply chain competencies amongst the staff is essential, but a parastatal such as a new (possibly improved) Drug Fund offers the chance to overcome the lack of outside funding, thus creating the potential for an efficient, internal market-driven supply chain for health commodities. Such an incentivised approach does not mean every commodity has to be charged for at the point of use: some commodities can subsidise others, and some parts of the health system can subsidise others too.

A TECHNOLOGY/IT DEVELOPMENT ROAD MAP

**EXAMPLES OF SMS
TECHNOLOGIES ADOPTED
IN DEVELOPING
COUNTRIES**

1. Plan International partnering with FrontlineSMS and Ushahidi to gather and analyse SMS reports on violence against children in Benin.
2. The use of SMS by the World Food Programme in west Africa to gather data on food prices in local markets
3. The technology to gather SMS data and put them into a spreadsheet-friendly format is well established. There are more examples of the use of technology that include the use of cards for customers like RedRose and Last Mile Mobile Solutions.
4. M-PESA in Kenya. Developed by Vodafone and launched by Safaricom, M-PESA is a small value (transactions capped at £500) electronic payments platform. In two years from launch, the technology was adopted by 40% of the Kenyan population and it was extended to institutional payments, enabling companies to pay salaries and collect bill payments.

mobile data capture for vaccinations, that could be easily modified to provide forecasting data.

The reason for focusing on the use of technology for improving the supply chain is primarily driven by the technological revolution which is impacting supply chain management in some countries. Drivers of this change have included the growth of mobile phone networks, the growth of 'cloud-based' data gathering, the improvement in local, small solar power capture and the gathering mass of experience as many parts of the world, including supply chain, see that technology and IT is no longer a luxury that exists in head offices but is held in the hand of front-line field staff. Examples are given in the box to the left.

From a strictly short-term, focused view of consumption data for supply chain forecasting, PSA suggest that SMS could provide a fundamental change to the way the Yemen supply chain is managed.

However, on the basis of a workshop and a survey it is not possible to make a recommendation beyond saying that this should be investigated by making use of already existing IT resources in country, in the MoH and in UN agencies and NGOs.

The supply chain strategy involves a road map of technological upgrading and innovation: firstly, to gather forecasting data, and, secondly, to improve the inventory visibility. Before this can be safely undertaken there is a need to understand better the technology infrastructure in Yemen, as well as understanding what is already being used. Hopefully, solutions are already in use, such as

RENOVATION OF STRUCTURES AND EQUIPMENT

Based on the discussions in the workshops, it would appear that some of the physical infrastructure of the supply chain is damaged or in a state of disrepair. The examples given were of warehouses with damaged roofs. There was also mention made of the vehicles used by the MoH. At some stage, these will need replacing and, from a supply chain point of view, this should be a planned replacement rather than waiting till they break down such that they are too expensive to repair.

Improved capacity building, procedures and supervision, a parastatal health supply chain agency, using technology to gather data and improve inventory visibility will all only have a degree of success if the physical assets of the supply chain (e.g. PCs, warehouses, trucks) are in good condition.

COSTED DEVELOPMENT PLAN

This section includes some cost considerations in regard to the four areas indicated in the strategy discussions.

- Capacity building: as mentioned, it is advised that the theory of change approach be applied, to ensure the capacity building is comprehensive. For a five-year theory of change implementation, an amount of \$150,000–180,000 a year is estimated, covering the central to facility to service distribution levels through a cascade approach, and a strong training of trainers.
- A national procurement agency: further investigations are needed to understand how such an agency could fit into the supply chain and play a parastatal role successfully, as has happened in other countries. It is estimated that seed funding of \$60,000 will be required to provide a business case.
- A technology/IT development road map: the use of SMS technology would represent the first step in developing a visibility tool, often referred to as a 'control tower'. The development costs of a control tower (with any technology for data collection) can be estimated at \$250,000.
- Renovation of structures and equipment. This area requires more investigation given the current state of the country and the complexities related to building new infrastructures and equipment, or renovating existing ones.

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