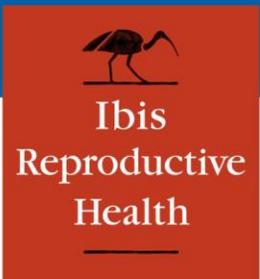




CONTRACEPTIVE STOCKOUTS

A Review of the Published and Grey Literature

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Acknowledgements

This document was written by Ella Douglas-Durham, Kelly Blanchard, and Sophie Higgins of Ibis Reproductive Health, through a contract with the Reproductive Health Supplies Coalition (RHSC). The authors worked closely with Ellen T. Tompsett, Senior Program Officer, Reducing Stockouts, throughout the process and thank her for her guidance, contributions, and support of this activity. The authors of this document would also like to thank John Skibiak, Brian McKenna and Don Lauro (RHSC) for their review of the report. Lastly, the authors would like to thank Mackenzie Sumwalt (Ibis) who provided research and editorial assistance in preparing this report.

Acronyms

ACT	artemisinin-based combination therapy
AL	artemether-lumefantrine
ART	antiretroviral therapy
ARV	antiretroviral
CBD	community-based distribution
CP	contraceptive prevalence
CPR	contraceptive prevalence rate
CS	contraceptive security
DFID	Department of International Development [United Kingdom]
DHMT	District Health Management Team
DISH	Delivery of Improved Services for Health
DMPA	depot medroxyprogesterone acetate
EHP	essential health product
FHI	Family Health International
FP	family planning
FWC	Family Welfare Centres
GPRHCS	Global Programme on Reproductive Health Commodity Security
ICRH	International Centre for Reproductive Health
IUD	intrauterine device
JSI	John Snow, Inc.
LMIS	logistic management information system
NGO	nongovernmental organization
ODI	Overseas Development Institute
PITC	provider-initiated HIV testing and counseling
PLHIV	people living with HIV
RH	reproductive health
RHSC	Reproductive Health Supplies Coalition
SDP	service-delivery points
SP	Sayana Press®
SSWG	Systems Strengthening Working Group
UNFPA	United Nations Population Fund
USAID	United States Agency for International Development
WHO	World Health Organization

Table of Contents

Acknowledgements	1
Acronyms	2
Executive Summary	4
Purpose	5
Background	5
Methods.....	6
Published literature search methods.....	6
Grey literature search methods.....	7
Uganda-specific grey literature search methods	8
Findings.....	8
Published literature findings	8
Contraceptive stockouts.....	8
Stockouts of other medicines	10
How to address stockouts	12
Grey literature findings	12
Contraceptive stockouts.....	12
Impact of stockouts	13
Prevalence or occurrence of stockouts.....	14
Measurements and modeling.....	20
Supply chain management.....	20
Uganda-specific grey literature findings.....	21
Contraceptive stockouts in Uganda	21
Status of Stockouts	22
Current efforts to address contraceptive stockouts in Uganda	24
Conclusion.....	26
Bibliography	28
Appendix I: List of organizations whose websites were searched for research on contraceptive stockouts	37
Appendix II: Bibliography of review articles with abstracts (alphabetical order within section)	38
Contraceptive stockouts.....	38
Other types of stockouts	42
How to address stockouts.....	45

Executive Summary

Improving access to contraception is a critical, highly cost-effective intervention for improving women's and children's health, reducing maternal mortality, and supporting women's ability to exercise their reproductive rights. However, in many developing countries, particularly in sub-Saharan Africa, effective contraceptive method use remains low, myths about the side effects or health risks of contraception are pervasive, and women have access to a limited range of methods. In order to overcome these barriers and significantly improve access to contraceptives, efforts in a number of areas will be needed, including reducing unnecessary medical barriers to access to existing methods; identifying and testing more user-friendly, novel approaches to distribution; and ensuring that existing distribution channels are working as effectively as possible. Stockouts have been identified as a barrier to access in a range of countries and settings, and addressing them is critical to ensuring women can access the method that is right for them.

This literature review summarizes existing published and grey¹ literature on the magnitude and impact of contraceptive stockouts to identify gaps in the existing literature and inform the development of research and advocacy to address stockouts. A contraceptive stockout occurs when one or more contraceptive options that, routinely or based on policy, should be available at a health facility are not available, either due to lack of supplies of the method itself, or lack of a trained provider or other equipment needed to offer the methods. The Reproductive Health Supplies Coalition has supported a stockout indicator harmonization effort, which defines a stockout as “zero usable stock of the product or method at the location being assessed.”² We searched relevant databases and the Internet for published and grey literature addressing the impact of contraceptive stockouts. Most of the literature reviewed on contraceptive stockouts discussed the prevalence of contraceptive stockouts and/or noted that contraceptive stockouts serve as a barrier to women accessing contraceptives. It also indicated that contraceptive stockouts may lead to method discontinuation and may even reduce demand if women think they cannot access contraceptives. Existing published literature on stockouts of other medicines, such as antimalarial medications and antiretrovirals, has documented negative health outcomes caused by delayed treatment uptake and treatment failure. In the context of contraception, it is reasonable to believe that stockouts could impact uptake and continuation, choice of method and client satisfaction with a method (which impacts both uptake and continuation), unintended and mistimed pregnancy, and potentially contribute to poor women's and children's health outcomes associated with unintended and mistimed pregnancy. However, there are little direct data addressing the impacts of contraceptive stockouts and more research in this area is needed.

¹ Grey literature is defined as reports or other documents (not including blogs, media, or audio files), including abstracts, meeting presentation notes, and other academic documents, available on the Internet, which may or may not be self-published by an individual or organization, but are not published in a peer-reviewed journal.

² Source: Reproductive Health Supplies Coalition. Forthcoming.

Purpose

The aim of this review of the published and grey literature was to provide a summary of existing data on the impact of contraceptive stockouts to inform both research and advocacy efforts to address them in a range of settings. Our initial focus was on the impact of stockouts on women and families, and interventions to address them, both in Uganda and other developing countries. However, as detailed under Findings, there were few sources that specifically addressed the impact of contraceptive stockouts, so we reviewed the published literature on stockouts more broadly, while keeping a focus on the impact of stockouts in the review of the grey literature.

The findings of the review will inform the development of a qualitative study, conducted by Ibis Reproductive Health in partnership with the Reproductive Health Supplies Coalition (RHSC), on the impact of contraceptive stockouts on women, family planning providers, and policymakers in Uganda; the results of this qualitative study will in turn inform the design and implementation of a larger quantitative study that will provide a more robust measurement of the magnitude of the impact of stockouts on women in Uganda. This review and new data are intended to support increased advocacy to address stockouts and improve women's access to contraception around the world.

Background

Improving access to contraception is a critical, highly cost-effective intervention for improving women's and children's health, reducing maternal mortality, and supporting women's ability to exercise their reproductive rights. Decades of research have documented the benefits of contraception access and use, but significant barriers to access remain (Agarwal, 2011; Sonfield, 2011; Singh, Darroch and Ashford, 2013). In many developing countries, particularly in sub-Saharan Africa, effective contraceptive method use remains low, myths about the side effects or health risks of contraception are pervasive, and women have access to a limited range of methods (Agarwal, 2011; Darroch, Sedgh and Ball, 2011; Singh, Darroch and Ashford, 2013). Making progress to reduce barriers to access to contraception will require efforts in a number of areas—developing new contraceptive methods, reducing unnecessary medical (and other) barriers to access to existing methods, identifying and testing more user-friendly and novel approaches to distribution, increasing access to family planning clinics and services, and ensuring that existing distribution channels are working as effectively as possible (Darroch, Sedgh and Ball, 2011).

In developing countries, one in four women who want to avoid becoming pregnant have an unmet need for modern contraception, and these women account for 82% of unintended pregnancies in the developing world (Darroch, Sedgh and Ball, 2011). Sub-Saharan Africa, South Central Asia, and Southeast Asia are home to 69% of women in the developing world who have an unmet need for a modern contraceptive method (Darroch, Sedgh and Ball, 2011). Each year across these three regions, 49 million women have unintended pregnancies, which lead to unplanned births, induced abortions (nearly three-quarters of which are unsafe), maternal deaths, and the loss of healthy years of life (Darroch, Sedgh and Ball, 2011).

Increased access to family planning services has been shown to lead to a range of benefits for women, children, and societies. Allowing women the ability to choose if and when to start a family, as well as spacing births and limiting family size, is not only imperative for ensuring women's autonomy, but also improves the health of both mothers and children. When women delay their first pregnancy and limit the size of their family, they are able to dedicate more time to educational and career advancement (Singh and Darroch, 2012).

In order to decrease the unmet need for modern contraceptives in the developing world, women need better access to contraceptive services and supplies (Darroch, Sedgh and Ball, 2011). The contraceptive methods that women use and the method mix in a given country are, in part, a product of the availability of contraceptive methods (Magadi and Curtis, 2003). As Hyttel, et al. (2012) note, contraceptive use is not only determined by demand, but also by availability, accessibility, and acceptability of methods. In addition to being important to uptake, access to a variety of contraceptive methods is also essential to choice, and some women using certain methods may actually prefer a less available method (Hyttel, et al., 2012). Access to a range of methods or to any method may reflect national decisions and systems for procurement, but may also reflect challenges in distribution as opposed to overall scarcity (Basu, 2005).

Addressing contraceptive stockouts has the potential to significantly increase access to contraception for women in a range of contexts, improving their lives, health and well-being, and the health and well-being of their children and families. The World Health Organization (WHO) identified addressing contraceptive stockouts as a key priority for global family planning research; contraceptive stockouts were listed as one of the top 15 research priorities (Ali, et al., 2014). These priority research areas were determined through a global survey of experts on contraception who were asked to identify and rank the types of research that would be needed to reduce the unmet need for family planning in the next decade (Ali, et al., 2014). This review lays the foundation for development of a contraceptive stockouts research agenda by summarizing existing research in the published and grey literature, synthesizing the existing data to inform the work of the RHSC and others, and identifying key areas where new research is needed. A report from the Overseas Development Institute (ODI) on stockouts of essential medicines in Tanzania (Wales, et al., 2014) argues that this ongoing problem will not be solved by any one solution, but through a coalition of different actors working together to address the issue. Though the authors focus on stockouts of all essential medicines, not just contraceptives, their recommendation of a coalition approach to address them is relevant for contraceptives as well.

The RHSC is building such a coordinated response to the global contraceptive stockouts problem through its Stockouts Initiative that includes research, advocacy, measurement, and partnership development activities; this work will be closely linked with the RHSC's work to hold governments and international organizations accountable to commitments to improve access to family planning. This review will provide a strong foundation for a number of the Stockouts Initiative activities, particularly development and implementation of new research to fill critical gaps and also global and country-level advocacy plans.

Methods

Published literature search methods

We searched for published literature on contraceptive stockouts using PubMed, JSTOR, and Google Scholar. We used the following search terms:

- *Contraceptive or contraceptives or contraception*
- *Stockout(s) or stock out(s) or stock-out(s)*
- *Contraceptive supply chain*
- *Impact*
- *Health outcomes*

We did not include any date restrictions on our search and included only articles available in English.

Using these search terms, we identified a first list of potential citations. Our searches on PubMed and JSTOR generated 23 and 17 articles, respectively. We reviewed their titles and abstracts, discarding those that were not relevant. Our search on Google Scholar yielded 1,370 results. We reviewed the first

five pages of results, which included a total of 50 articles, and stopped reviewing Google Scholar results as they became less relevant. We also reviewed the references of the relevant articles generated by our search. We identified ten articles on contraceptive stockouts.

Because of the small number of articles on contraceptive stockouts, we also conducted a search on stockouts of other medicines through searching for *stockout(s)* or *stock out(s)* or *stock-out(s)* in PubMed and reviewed the first two pages of findings for relevant articles. This search yielded eight articles; we did not conduct a systematic review on stockouts of other medicines.

Finally, we reviewed the references of articles generated by the initial search and also reviewed articles that discussed ways to address stockouts; the findings of these articles are described in the final published literature section of the review.

Grey literature search methods

We searched for unpublished, grey literature³ on contraceptive stockouts through a Google search using the phrase *impact of contraceptive stockouts*. We used this phrase because our goal was to review the grey literature focused on the impact of contraceptive stockouts, as opposed to the grey literature on stockouts more broadly. A reproductive, maternal, newborn and child health literature review included a broader scan of the grey literature related to stockouts of essential maternal and child health commodities (SIAPS, 2014); because this previous work reviewed the grey literature on stockouts and supply chain management broadly and due to our specific interest in documentation of impact of stockouts on women and health care providers, we focused our grey literature search on resources that provided information on the *impact* of contraceptive stockouts.

To identify whether items returned in the Google search would be reviewed in detail, we opened each link and searched the web page, article, or document using the “find” feature for the phrases *stockouts*, *stock-outs*, *stock outs*, and *availability*. If the search yielded no items, the web page, article, or document was excluded from further review.

We also conducted a review of organization websites and reports from a list generated by a survey conducted by the Systems Strengthening Working Group (SSWG) Stockout Indicator Workstream.⁴ Each website or report was searched for the phrases *contraceptive stockout* or *contraceptive stock-out* or *contraceptive stock out*. See Appendix I for a complete list of these organizations.

Websites, articles, or documents also had to meet the following two criteria to be included in the more detailed review:

- Published in 2009 or later
- Discussed contraceptive stockouts, including: impact on women, families, or health workers; prevalence of stockouts; and interventions or advocacy work related to reducing or eliminating stockouts

We excluded media results such as news articles, magazine articles, or blog posts from the review. In addition to this search of grey literature on contraceptive stockouts in general, we also conducted a search for grey literature on contraceptive stockouts specifically in Uganda.

³ Grey literature is defined as reports or other documents (not including blogs, media, or audio files), including abstracts, meeting presentation notes, and other academic documents, available on the Internet, which may or may not be self-published by an individual or organization, but are not published in a peer-reviewed journal.

⁴ This list of organizations was generated by the Stockout Indicator Advisory Group through its survey of members on measurement and tracking of contraceptive stockouts.

Uganda-specific grey literature search methods

We searched for grey literature on contraceptive stockouts in Uganda first through a Google search of the phrase *contraceptive stockouts Uganda*. This initial search yielded 33,900 results. We reviewed the first five pages of results, which included a total of 50 results, and included results with quantitative data on the prevalence of contraceptive stockouts in Uganda or with an in-depth review of the contraceptive supply chain in Uganda. In addition to this Google search, we searched the websites of relevant organizations for *contraceptive Uganda* and *contraceptive stockout Uganda*. We searched the websites of organizations that RHSC reached out to during their indicator work, as well as the websites of organizations listed as development partners in Leahy and Akitobi's case study of reproductive health supplies in Uganda (2009). See Appendix I for a full list of these organizations.

Results ranged from analyses of supply chains of reproductive health supply commodities to studies of community-based health care systems. Google results and websites that did not contain information on contraceptive stockouts in Uganda were eliminated.

Findings

Published literature findings

Our search of the published literature identified articles on contraceptive stockouts, stockouts of other medicines, and a small sample of articles on how to address them. The articles reviewed noted that contraceptive stockouts are a determinant of client satisfaction, could increase discontinuation of certain contraceptives, potentially lead to health care providers turning family planning clients away, and as a result, potentially increase women's risk of unintended pregnancy in a range of circumstances. The literature on stockouts of other medicines shows that stockouts can lead to delayed initiation of treatment, treatment interruption and failure, and identify them as demotivating for health care providers. The articles reviewed on potential solutions to addressing stockouts identified the need to improve logistic management systems and drug forecasting to address the problem.

Contraceptive stockouts

Our search of the published literature yielded ten articles from seven countries that specifically addressed the prevalence and/or impact of contraceptive stockouts. Most of the published articles discussed the prevalence of contraceptive stockouts or noted that they may be one of many factors that impede women's contraceptive access, uptake, and continuation. However, few published articles contained data on the direct impact of contraceptive stockouts on women or health systems.

In their article on improving quality of care through operations research, Bruce and Jain (1991) noted choice of contraceptive methods as one of the six elements of quality of care. Choice of methods is important to quality of care for a number of reasons: as women pass through different life stages, they will have varying contraceptive needs; the availability of multiple contraceptive methods allows for switching between different methods; and a diverse method mix increases the likelihood that at least some contraceptive methods will be available even when distribution is erratic (Bruce and Jain, 1991). Bruce and Jain cite evidence from Hong Kong, India, South Korea, Taiwan, and Thailand showing that adding a method to the contraceptive method mix results in an increase in contraceptive prevalence; further research in Taiwan supports the hypothesis that the availability of multiple methods improves continuation of contraceptive use (Bruce and Jain, 1991). Though this hypothesis is highly intriguing, it has yet to be well substantiated and rigorous research on this question is needed.

Although Bruce and Jain provided evidence of the benefits of choice of contraceptive method, including higher contraceptive prevalence, increased contraceptive continuation, and decreased fertility, few studies have directly addressed the impact of lack of access to one or more methods, or method stockouts, directly. In many cases, stockouts were only mentioned briefly as one of a number of potential barriers to access to contraception. Cernada, et al. (1993) described “the availability, functioning, and quality of health and family planning activities in a representative sample of service delivery outlets” (Cernada, et al., 1993). In their situation analysis of public family planning service delivery in Pakistan, they identified stockouts as a significant problem; on the day of the authors’ visits to the Family Welfare Centres (FWC), none of the clinics had the full range of methods available. All of the FWCs had condoms in stock, 89% had oral contraceptive pills, 83% had injectables, 77% had Copper T IUDs, and none had spermicides in stock (Cernada, et al., 1993). Only 75% of the FWCs visited had oral pills, condoms, IUDs, and injectables in stock (Cernada, et al., 1993). This study did not provide data on the impact of these contraceptive stockouts. Hutchinson, et al. (2011) reported that contraceptive stockouts were a determinant of client satisfaction; family planning client satisfaction in Tanzania, Kenya, and Ghana, was considerably higher at private facilities, which the authors attributed in part to fewer stockouts of contraceptive methods and supplies. In Kenya, two-thirds of respondents said there was “no problem” with availability at public clinics, compared to 91% at private clinics. Similar results were found in Tanzania, but in Ghana participants reported that both public and private clinics were high quality (Hutchinson, et al., 2011). The authors were unable to determine how much of client satisfaction was due to the availability of contraceptive methods, and also cited the length of waiting times as a factor that influenced participant satisfaction.

Stockouts have also been cited as a reason for discontinuation of injectable contraceptives in Kenya (Burke and Ambasa-Shisanya, 2011), and as a reason that providers in Uganda and Senegal turn family planning clients away (Cover, et al., 2014). Burke and Ambasa-Shisanya reported that 22% of married women clients in Kenya used injectable contraceptives as a method of family planning but 29% of them discontinued their usage within the first 12 months; both users and providers cited stockouts as a reason for this discontinuation (Burke and Ambasa-Shisanya, 2011). Cover, et al. found that even when injectables are in stock, there may be a stockout of syringes, which also inhibits women’s access to injectable contraceptives. Burke, et al (2014) and Cover, et al. (2014) argue that the introduction of Sayana® Press into the contraceptive method mix could potentially reduce supply problems, including stockouts, in part because of its all-inclusive packaging, which includes syringes. Lastly, shortages of contraceptives and uneven distribution of contraceptive methods and supplies are cited as reasons for women’s unmet need for contraception in developing countries (Darroch, Sedgh and Ball, 2011), and as major reasons for the continued high rates of unintended pregnancy in Romania (Serbanescu, et al., 1995). Ten to eleven percent of unmet family planning need in sub-Saharan Africa is due to “poor contraceptive access” (Darroch, Sedgh and Ball, 2011); this figure includes women who do not know where to find a clinic, cannot afford a method, and live too far from a clinic.

One study focusing on facility-level reproductive health interventions and contraceptive use in Uganda found that for women living in urban areas, proximity to a private health facility offering family planning (defined as living in a community with at least two health clinics providing pills, injectables, and condoms) was positively associated (OR 1.7, $p < 0.08$) with contraceptive use (Ketende, et al., 2003). The authors stated that maintaining regular contraceptive supplies at the facility level was an important factor for women to begin and continue contraceptive use (Ketende, et al., 2003). Ketende et al. found stockouts of three major types of contraceptives in their survey: one in four facilities lacked the pill, one in five experienced a shortage of injectables, and more than half did not have condoms (Ketende et al., 2003). However, the authors highlighted an important challenge in interpreting cross-sectional data on stockouts and contraceptive use. The authors initially ran a model that included a variable for stockouts of contraceptive supplies, but they excluded such a variable from their final analysis because “the direction of causality is unclear. For example, stock-outs [*sic*] at a community’s health facility may have resulted in

fewer women being able to obtain a method (association with low prevalence) or stock-outs [*sic*] may have been caused by greater demand for contraceptive supplies (association with high prevalence).”

Authors of another study of women’s experience with injectable hormonal contraceptives and provider and policymaker perceptions of the method in Uganda cited a government report analyzing health management information system data and a Department of International Development (DFID) case study as evidence that contraceptive stockouts have decreased since 2009. However, they reported that stockouts of injectables, attributed to lack of funding and regulatory and forecasting difficulties, contributed to unmet contraceptive need. Unfortunately, there was no specific data provided to support the link between stockouts and use of injectables (Hyttel, et al., 2012). The authors indicated that the integration of injectable contraceptives into the national pull-based distribution system, which allows facilities to order the drugs and supplies that they need through the District Medical Officer’s office which then distributes items to facilities, led to less frequent stockouts. The study also discussed the fact that the fear of side effects was cited by women more often than lack of availability as the main reason for unmet need (Hyttel, et al., 2012).

Stockouts of other medicines

Because of the small amount of data specifically on contraceptive stockouts, we also reviewed the literature on stockouts of other medicines in sub-Saharan Africa to assess whether there were important lessons learned that would be relevant to understanding the impact of and addressing contraceptive stockouts. We found ten articles that addressed stockouts of other medicines in six countries. These articles highlighted the multiple causes of and the negative health outcomes due to stockouts. In addition to negative health outcomes, these articles also emphasized the demotivating effects of stockouts on both patients and providers.

Other types of stockouts, such as stockouts of antiretrovirals (ARVs) and drugs to treat malaria, are often caused by similar supply chain issues that lead to contraceptive stockouts, and they can also result in negative health consequences. A number of studies have documented the association between ARV stockouts and unplanned HIV treatment interruption in Cameroon, Malawi, and other developing countries (Boyer, et al., 2011; Harries, et al., 2007; Kranzer and Ford, 2011). Unstructured and unplanned treatment interruption of antiretroviral therapy can lead to drug resistance and/or treatment failure (Harries, et al., 2007). In their study on treatment adherence in Cameroon, Boyer et al. found that a significantly higher proportion of patients reported financial difficulties (an indicator of poverty) in treatment centers experiencing stockouts. The authors stated that stockouts play a critical role in equitable access to HIV care, as poor individuals are more likely to be confronted with an ARV stockout (Boyer, et al., 2011).

In a qualitative study on early initiation of antiretroviral therapy (ART) in eastern Uganda, participants reported that the inadequate stock or complete lack of ARVs was a demotivating factor to starting treatment; many reported being told they were ready to begin ART, only to be told that there were no drugs. Stockouts of ARVs thus delayed the initiation of care in HIV-positive individuals aware of their HIV status. Participants reported having to wait for ARVs for months, which made them feel discouraged and led them to seek out local herbs and traditional medicine for treatment (Muhamadi, et al., 2010). Stockouts of other HIV prevention, treatment, and testing supplies, including HIV test kits, nevirapine tablets for pregnant women, condoms, reagents for testing for syphilis, gloves, disinfectants, and cotrimoxazole prophylaxis influence providers’ ability to provide high-quality care to their patients (Medley and Kennedy, 2010). Medley and Kennedy reported that during a shortage of nevirapine in Uganda, at least one clinic was unable to provide this drug to five birthing women; these types of stockouts influenced the quality of care providers were able to provide, and were also a source of frustration for providers (Medley and Kennedy, 2010).

Research on stockouts of artemisinin-based combination therapy (ACT), the recommended first-line treatment for malaria, has shown that providers' prescribing practices vary based on drug availability (Hensen, et al., 2011). In a systematic review of published literature on the prescribing practices of providers in the context of ACT stock, stockouts were found in 5.7% to 48.9% of facilities surveyed, and the absence of ACT stock explained much of the non-ACT prescribing behavior among providers (Hensen, et al., 2011). Further, research has shown that an insufficient supply of drugs and the fear of stockouts has led health workers in Kenya to avoid prescribing certain drugs, such as artemether-lumefantrine (AL), which is a specific ACT (Wasunna, et al., 2008). In a qualitative study looking at health workers' prescription of ACT, health workers in all five study districts reported an inconsistent supply of AL and a shortage of some doses. This led health workers to ration the drug and give the drug to those patients they perceived as most in need or most deserving, because they were uncertain when they would receive the next supply (Wasunna, et al., 2008). Due to stockouts and AL rationing, many patients did not receive treatment in line with national and WHO guidelines (Wasunna, et al., 2008).

In a mixed methods study of staff experiences of providing maternity services in rural Tanzania, Penfold, et al. (2013) documented the various effects of poorly maintained equipment and stockouts of key drugs, and briefly described the drug distribution system that led to these stockouts. Drug distribution in Tanzania occurred through a pull system in which facilities ordered the drugs and supplies that they needed through the District Medical Officer's office, which then distributed items to facilities (Penfold, et al., 2013).

A national medicine supply assessment conducted by the Tanzania Ministry of Health and Social Welfare found a high availability of drugs overall, but also frequent stockout days and long-lasting stockouts, due to poor stock management (Penfold, et al., 2013). In the Penfold, et al. study, staff reported stockouts lasting from three days to a year, which were not resolved when they informed the District Medical Officer's office: "We have been out of stock for about a year now, and we informed the DMO [district medical officer] office. They just tell us to wait because there is no stock" (Penfold, et al., 2013). Staff also reported receiving drugs and supplies that they had not requested.

Additionally, a National Health Service assessment of maternal health care found that antenatal care was available at almost all government facilities, but that fewer than half of these facilities had all the essential equipment, drugs, and supplies needed for basic antenatal care (Penfold, et al., 2013). Poorly maintained equipment and stockouts of essential drugs contributed to delays in "women receiving timely and appropriate maternity care upon reaching a facility...which increases the risk of maternal and newborn mortality through delayed treatment of obstetric complications" (Penfold, et al., 2013). In addition to resulting in suboptimal care for patients, stockouts also increased staff workload because of the need to seek out missing supplies from neighboring facilities or make unnecessary patient referrals due to lack of necessary drugs or equipment. Staff also reported feeling blamed by the community for drug stockouts and lack of functional equipment, and that the lack of supplies had a direct effect on staff morale and confidence to provide patient care (Penfold, et al., 2013).

Although stockouts of ARVs, drugs to treat malaria, and drugs and supplies needed for maternity services may or may not be the result of similar health systems and other challenges, and may lead to different health and other outcomes than contraception stockouts, experience with stockouts of those drugs and supplies highlight some of the impacts of stockouts in general: delayed care, interruption or discontinuation of care, negative health impacts associated with delayed or interrupted care, and increased frustration and decreased confidence among providers. Translating these findings to the context of contraceptive supplies, it is reasonable to believe that contraceptive stockouts could impact uptake and continuation, choice of method and client satisfaction with method (which both impact uptake and continuation), unintended and mistimed pregnancy and poor women's and children's health

outcomes associates with unintended and mistimed pregnancy. As mentioned previously, there is little direct data addressing the impact of contraceptive stockouts and more research in this area is needed.

How to address stockouts

The research reviewed highlighted a number of structural and bureaucratic reasons for drug stockouts. A study on ACT availability in Tanzania found that the lack of ACT stock and irregular availability of the drug was due to cumbersome bureaucratic processes and delays both within the country and from the major donor of ACT stock (Mikkelsen-Lopez, et al., 2014). Another study on stockouts of essential health supplies in Mozambique found that facility-level stockouts were more frequent at facilities further from district capitals, and occurred even when there was stock in the district (Wagenaar, et al., 2014). To address the problem of stockouts, the authors of these articles recommended strengthening the supply and health information systems, improving supply chains and communication, and improving forecasting of drug needs. We found no published literature evaluating interventions to address contraceptive stockouts, but there are a number of ongoing initiatives currently being implemented, including those to improve drug forecasting and procurement through improved logistics management and information systems, which we hope will be rigorously evaluated and provide important information about successful strategies for reducing contraceptive stockouts.

Grey literature findings

Due to the small number of results that specifically assessed the impact of stockouts, we reviewed and summarized all of the documents in which contraceptive stockouts were discussed, even if they were only mentioned as a factor or one of a number of factors that impact women's ability to access contraceptives. The 53 data sources reviewed here include three PowerPoint and Prezi presentations that discussed the impact and/or magnitude of stockouts, six website project descriptions that were not part of larger published reports, one interactive website, and 43 reports and working papers from nonprofits, universities, and government organizations such as the United States Agency for International Development (USAID). Sixteen blog posts or news articles that mentioned published or unpublished literature on stockouts were identified in the Google search but were not included in this literature review. We summarized the content of the items reviewed, grouped by the type of information provided: impact of stockouts, prevalence or occurrence of stockouts, and measurements and modeling.

Contraceptive stockouts

Searching for the phrase *impact of contraceptive stockouts* using the Google search engine returned 18,200 results. We reviewed the first 125 results, after which the results became less and less relevant. Forty-seven of the 125 results met our criteria for relevance. We identified an additional six results in our review of the organization websites and reports generated from the SSWG Stockout Indicator Workstream, for a total of 53 items included in this review.

Despite evidence from published and grey literature that stockouts negatively affect women's ability to access contraceptives, there is little grey literature addressing the impact of stockouts on women, their families, and service providers. A number of reports discuss the benefits of contraceptive access, the general impacts of stockouts on women and health care providers, and the high prevalence of contraceptive stockouts.

The report, *Five Challenges, One Solution: Women*, released at the 2012 World Economic Forum, characterized the unmet need for contraceptives and contraceptive services as a global phenomenon, and one that is particularly pertinent for those women living in developing countries. The report noted the importance of access to contraceptives, stating that "early childbearing usually deprives young women of the opportunity to pursue other activities, such as schooling or employment, which are strong

determinants of their empowerment” (World Economic Forum, 2012). An essential component of reducing unmet need is expanding not only the accessibility and availability of contraceptives and family planning services, but also ensuring “access to a full array of effective contraceptive methods” (World Economic Forum, 2012). The Bill & Melinda Gates Foundation report, *Urban RH Supply Chain assessment*, reiterated this point, stating that “stock-outs [*sic*] and shortages of contraceptive products are impacting women’s ability to choose and use their method of choice” (Bill & Melinda Gates Foundation, 2011).

Impact of stockouts

Most of the grey literature identified in our search did not quantify or specifically assess the impact of stockouts beyond a cursory mention that stockouts may limit women’s ability to access contraceptives and contraceptive services. Some of the reports identified in our search, however, did discuss the benefits of contraceptive access, such as reduced unintended pregnancies; the general impacts of stockouts on women, including discontinuation of contraceptive use; and the impacts of stockouts on health care providers, including frustration and low job satisfaction.

A 2011 report by the DFID Nigeria Human Development Team about an intervention designed to expand family planning commodities in the public sector by offering contraceptives, free of charge, listed reductions in unintended pregnancy, maternal mortality, and improved health outcomes among both women and children as potential benefits of increased access to contraceptives (DFID Nigeria, 2011). The report also noted that these immediate impacts could lead to increases in “school enrolment, nutritional status, women’s empowerment” (DFID Nigeria, 2011). Although the report did not directly discuss or quantify the impact of stockouts, it emphasized the positive impacts of contraceptive access.

The literature reviewed highlighted discontinuation of contraceptive method use as a significant impact of contraceptive stockouts. Bailey (2010) noted that “stockouts and prohibitive costs” were reasons women provided for discontinuing use of contraceptives. Hubacher (2011) also listed stockouts among the reasons that women discontinue contraceptive use. Hubacher argued that discontinuation of contraceptive use is likely to be lower when there is “direct involvement of the user in the choice of method,” citing an Indonesian study that showed a stark contrast in discontinuation rates after 12 months of use between women who were given a method that was their first choice (8.9%) and those denied their choice (72.2%) (Hubacher, 2011). The findings of this presentation at the 2011 International Conference on Family Planning were subsequently published (Hubacher et al., 2012).

A 2012 Save the Children report, which focused on family planning’s role in improving children’s health, speculated that contraceptive stockouts may affect women’s decision to discontinue contraceptives by causing them to lose “faith in the health service” (Rawe, 2012). The author noted that, particularly for those women whose access to contraceptive services is already impacted by cost or distance from a clinic, a shortage or complete lack of their preferred method may further contribute to discontinuation of contraceptives (Rawe, 2012). The author described increasing contraceptive prevalence as the aim of efforts to reduce or eliminate stockouts, a goal that can be hampered by factors that contribute to higher discontinuation rates (Rawe, 2012).

A presentation at the 2013 International Family Planning Conference emphasized method mix as a key component in contraceptive uptake, noting that, in a cluster analysis of contraceptive prevalence in East Africa, “each additional method available increases contraceptive prevalence by approximately 6–7 percentage points” (Stover, 2013). This finding reiterates a point made in a number of additional items we reviewed during this search: the increase in discontinuation of contraceptives due to stockouts may be due to either an overall stockout (no availability of contraceptives) or specific stockouts (limited availability of specific contraceptive methods) (Namazzi, 2013; Daire, 2011). USAID | DELIVER’s contraceptive security indicators data for 2013, which assessed contraceptive security in 43 countries included “number

of contraceptive options available” (USAID| DELIVER, 2013) as an indicator of contraceptive security. This indicator, along with the data obtained through this search highlights the fact that it is critical to address access to a range of methods, not only whether contraceptives in general are in stock.

A number of the items reviewed also addressed the impact of stockouts on health care workers responsible for providing contraceptives to women. These reports and documents consistently noted the negative impact of stockouts on health care workers’ ability to provide high-quality care to women seeking contraceptives or contraceptive services, but did not include specific estimates or data on the percentage of service providers who experience the negative impact of stockouts.

A 2011 USAID | DELIVER PROJECT and Pathfinder report on the critical role of service providers in promoting contraceptive security stated that experiences with contraceptive insecurity, including stockouts, interfered with service providers’ ability to provide “integrated and quality services,” often leading to “providers’ frustration and job dissatisfaction” (USAID | DELIVER and Pathfinder, 2011). The same report suggested that, as the facilitator between the overall health system and their clients, setbacks within the supply chain may act as a demotivating factor for providers, eventually leading to “diminished confidence among clients in clinical services and the overall health system” (USAID | DELIVER and Pathfinder, 2011).

A 2014 project brief by the RESPOND Project reiterated the negative impact stockouts have on providers. The report stated that service providers in Tanzania expressed “frustration with irregular stock of contraceptives and related supplies” before the implementation of the COPE [client-oriented, provider-efficient] for contraceptive security approach, a quality improvement strategy that uses checklists and facility-specific guidelines to give providers the tools to promote contraceptive security (Samandari and Wickstrom, 2014).

The Save the Children report (Rawe, 2012) also made note of the critical role health workers play in improving contraceptive prevalence and promoting reproductive choice; a role that can be quickly hampered by stockouts. The report stated that “health workers must have sufficient supplies, materials and equipment available to do their jobs. If clinics are stocked-out... they will not be able to provide family planning services, and the people they are working with will lose trust in them” (Rawe, 2012).

In a June 2014 newsletter, the International Centre for Reproductive Health (ICRH) stated it had “obtained an Innovation Grant from the Reproductive Health Supplies Coalition to investigate how contraception stock-outs [sic] can be avoided by enhancing the motivation of health centre staff” (ICRH, 2014), which highlights service providers’ role in preventing and addressing stockouts. This is one example of a potentially innovative way of addressing stockouts focusing on providers and their motivation. If found to be successful, this intervention could potentially support a cycle of improved provider motivation, leading to few stockouts and higher experienced quality of care leading to higher job satisfaction and improved access to contraception. Addressing these downstream impacts of addressing stockouts are important potential areas for future research.

Prevalence or occurrence of stockouts

Eight of the data sources identified by our search included data on the prevalence or occurrence of contraceptive stockouts in a range of settings and countries. We summarize this data in Table 1. Due to the variety of ways a stockout was measured, Table 1 organizes all available prevalence data in the grey literature by the source of data and includes a summary of the source of data, country where data was obtained, how a stockout was measured, and the specific contraceptive stockout prevalence reported. These reports include data from a wide range of developing countries in Africa, Southeast Asia, and the Caribbean. The prevalence of stockouts varied greatly across reports, ranging from 0.8% in Ethiopia to

more than 80% in Senegal. Some reports included stockout rates by method, whereas others included the stockout rate for “all contraceptives,” making it difficult to compare the stockout rates of different contraceptive methods across countries.

Table 1 Summary data on the prevalence or occurrence of contraceptive stockouts in a range of settings and countries.

Report	Source of data	Country	Measurement Method	% Reported Stockouts
Barkat A, Majid M, Karim A, Siddiquee SH, Mahmud MN. <i>Human and economic impact of RH supplies shortage & stock-outs in Bangladesh. Dhaka, Bangladesh: Family Planning Association of Bangladesh; August 2009.</i>	Report used data from “Family Planning Monthly Logistics Report of DGFP”: Combined prevalence of stockouts on male condoms, oral contraceptives, and injectables	Bangladesh	“Were you faced with a stockout/shortage of pills, injectables or condoms, any time in the previous year?”	<u>2009</u> : Pills, injectables, and condoms: 24.16% to 44.58%
High Impact Practices in Family Planning (HIP). <i>Supply chain management: Investing in contraceptive security and strengthening health systems. Washington, DC: USAID; 2012.</i>	USAID DELIVER PROJECT report data: Prevalence of stockouts for oral contraceptives, injectables, implants, and male condoms (separately) and for years 2004, 2006, and 2011.	Rwanda	Facilities reporting stockouts at time of visit.	<u>2004</u> : Oral Contraceptives: 33.0%; Injectables: 21.0%; Implants: 37.0%; Male Condoms: 61.0%; <u>2006</u> : Oral Contraceptives: 13.0%; Injectables: 8.0%; Implants: 8.0%; Male Condoms: 18.0%; <u>2011</u> : Oral Contraceptives: 1.0%; Injectables: 2.0%; Implants: 3.0%; Male Condoms: 3.0%
USAID Health Policy Initiative, Task Order 1, and USAID DELIVER PROJECT, Task Order 1. 2010. <i>Analysis of the Operational Policy Barriers to Financing and Procuring Contraceptives in Madagascar. Washington, DC: Health Policy Initiative, Futures Group; and Arlington, VA: USAID DELIVER PROJECT, Task Order 1.</i>	Madagascar Demographic and Health Surveys	Madagascar	Six-month stockout rate: the percentage of facilities experiencing a stockout of a particular product for any duration over a defined six-month period.	<u>2008</u> : Injectables: 0%
United Nations Population Fund (UNFPA). <i>The global programme to enhance reproductive health commodity security: Annual report 2013. New York, NY: UNFPA; 2014</i>	Global Programme on Reproductive Health Commodity Security (GPRHCS) and sample surveys	Burkina Faso	Facilities reporting stockouts of contraceptives in the six months prior to the survey.	<u>2013</u> : Any modern contraceptives ⁵⁶ : 20.1%

⁵ Male condoms, female condoms, oral contraceptives, and injectables.

⁶ The percentage of facilities experiencing stockouts in countries featured in *The global programme to enhance reproductive health commodity security: Annual report 2013* was calculated by subtracting the percentage of facilities reporting no stockout of contraceptives from 100.

Report	Source of data	Country	Measurement Method	% Reported Stockouts
United Nations Population Fund (UNFPA). <i>The global programme to enhance reproductive health commodity security: Annual report 2013</i> . New York, NY: UNFPA; 2014	GPRHCS and sample surveys	Congo (Brazzaville)	Facilities reporting stockouts of contraceptives in the six months prior to the survey.	<u>2013</u> : All contraceptives: 50.0%
United Nations Population Fund (UNFPA). <i>The global programme to enhance reproductive health commodity security: Annual report 2013</i> . New York, NY: UNFPA; 2014	GPRHCS and sample surveys	Côte d'Ivoire	Facilities reporting stockouts of contraceptives in the six months prior to the survey.	<u>2013</u> : All contraceptives: 96.7%
United Nations Population Fund (UNFPA). <i>The global programme to enhance reproductive health commodity security: Annual report 2013</i> . New York, NY: UNFPA; 2014	GPRHCS and sample surveys	Djibouti	Facilities reporting stockouts of contraceptives in the six months prior to the survey.	<u>2013</u> : All contraceptives: 75.0%
United Nations Population Fund (UNFPA). <i>The global programme to enhance reproductive health commodity security: Annual report 2013</i> . New York, NY: UNFPA; 2014	GPRHCS and sample surveys	Ethiopia	Facilities reporting stockouts of contraceptives in the six months prior to the survey.	<u>2013</u> : All contraceptives: 0.5%
United Nations Population Fund (UNFPA). <i>The global programme to enhance reproductive health commodity security: Annual report 2013</i> . New York, NY: UNFPA; 2014	GPRHCS and sample surveys	Gambia	Facilities reporting stockouts of contraceptives in the six months prior to the survey.	<u>2013</u> : All contraceptives: 67.4%
United Nations Population Fund (UNFPA). <i>The global programme to enhance reproductive health commodity security: Annual report 2013</i> . New York, NY: UNFPA; 2014	GPRHCS and sample surveys	Haiti	Facilities reporting stockouts of contraceptives in the six months prior to the survey.	<u>2013</u> : All contraceptives: 73.6%
United Nations Population Fund (UNFPA). <i>The global programme to enhance reproductive health commodity security: Annual report 2013</i> . New York, NY: UNFPA; 2014	GPRHCS and sample surveys	Honduras	Facilities reporting stockouts of contraceptives in the six months prior to the survey.	<u>2013</u> : All contraceptives: 67.9%
United Nations Population Fund (UNFPA). <i>The global programme to enhance reproductive health</i>	GPRHCS and sample surveys	Lao PDR	Facilities reporting stockouts of contraceptives in the six months prior to the survey.	<u>2013</u> : All contraceptives: 18.8%

Report	Source of data	Country	Measurement Method	% Reported Stockouts
<i>commodity security: Annual report 2013. New York, NY: UNFPA; 2014</i>				
United Nations Population Fund (UNFPA). <i>The global programme to enhance reproductive health commodity security: Annual report 2013. New York, NY: UNFPA; 2014</i>	GPRHCS and sample surveys	Liberia	Facilities reporting stockouts of contraceptives in the six months prior to the survey.	<u>2013</u> : All contraceptives: 75.5%
United Nations Population Fund (UNFPA). <i>The global programme to enhance reproductive health commodity security: Annual report 2013. New York, NY: UNFPA; 2014</i>	GPRHCS and sample surveys	Mali	Facilities reporting stockouts of contraceptives in the six months prior to the survey.	<u>2013</u> : All contraceptives: 53.4%
United Nations Population Fund (UNFPA). <i>The global programme to enhance reproductive health commodity security: Annual report 2013. New York, NY: UNFPA; 2014</i>	GPRHCS and sample surveys	Nepal	Facilities reporting stockouts of contraceptives in the six months prior to the survey.	<u>2013</u> : All contraceptives: 20.1%
United Nations Population Fund (UNFPA). <i>The global programme to enhance reproductive health commodity security: Annual report 2013. New York, NY: UNFPA; 2014</i>	GPRHCS and sample surveys	Niger	Facilities reporting stockouts of contraceptives in the six months prior to the survey.	<u>2013</u> : All contraceptives: 34.7%
United Nations Population Fund (UNFPA). <i>The global programme to enhance reproductive health commodity security: Annual report 2013. New York, NY: UNFPA; 2014</i>	GPRHCS and sample surveys	Nigeria	Facilities reporting stockouts of contraceptives in the three months prior to the survey.	<u>2013</u> : All contraceptives: 49.5%
United Nations Population Fund (UNFPA). <i>The global programme to enhance reproductive health commodity security: Annual report 2013. New York, NY: UNFPA; 2014</i>	GPRHCS and sample surveys	Sierra Leone	Facilities reporting stockouts of contraceptives in the six months prior to the survey.	<u>2013</u> : All contraceptives: 47.7%
United Nations Population Fund (UNFPA). <i>The global programme to enhance reproductive health commodity security: Annual report 2013. New York, NY: UNFPA; 2014</i>	GPRHCS and sample surveys	Timor-Leste	Facilities reporting stockouts of contraceptives in the six months prior to the survey.	<u>2013</u> : All contraceptives: 74.0%

Report	Source of data	Country	Measurement Method	% Reported Stockouts
United Nations Population Fund (UNFPA). <i>The global programme to enhance reproductive health commodity security: Annual report 2013</i>. New York, NY: UNFPA; 2014	GPRHCS and sample surveys	Togo	Facilities reporting stockouts of contraceptives in the six months prior to the survey.	<u>2013</u> : All contraceptives: 92.3%
Mahmoud A. <i>Birth spacing and family planning uptake in Pakistan: Evidence from FALAH</i>. Islamabad, Pakistan: Population Council; March 2012.	End line survey	Pakistan	Facilities reporting stockouts in the past three months.	<u>2011-2012</u> : All contraceptives: 51%
Ashraf N, Field E, Lee J. <i>Household bargaining and excess fertility: An experimental study in Zambia [unpublished manuscript]</i>. Cambridge, MA: Harvard University; September 6, 2013.	USAID survey data	Zambia	Facilities reporting stockouts in the past three months.	<u>October-December 2007</u> : <i>Injectables</i> : 53.0% for an average of 54 out of 90 days; <i>Contraceptive pills</i> : 28% for an average of 35 out of 90 days
Merck. <i>Merck for mothers: Program report</i>. Whitehouse Station, New Jersey: Merck & Co., Inc.; April 2014.	Merck for Mothers survey data	Senegal	Facilities reporting stockouts	<u>2012</u> : All contraceptives: >80.0%
Quality Health Partners and the Ghana Health Service. <i>Assessing the impact of family planning promotional campaigns in selected districts in Ghana</i>. Accra, Ghana: Quality Health Partners; 2009.	Collection/compilation of family planning service statistics from January 2007 to March 2009 at both facility and district level for selected districts and facilities that participated in the family planning campaigns	Ghana	Facilities reporting at least one day of stockouts during one month.	<u>2008</u> : <i>Injectables</i> : 46%

Measurements and modeling

Our search yielded several reports that advocated for improved strategies to measure and model the impact of stockouts. These reports suggest different approaches for measuring stockouts and modeling their potential effects. RHSC used Futures Institute analyses to create a model that “provides an idea of the magnitude of the potential benefits to be gained by reducing or eliminating stockouts” (RHSC, date of publication unavailable). RHSC suggested that this model could be used to support advocacy and policy work, while simultaneously highlighting the need for further and more accurate research into nation-specific stockout rates.

A USAID Learning Lab worksheet included an indicator to measure the “United States government-assisted service delivery points (SDPs) that experience a stockout any time during the reporting period of any contraceptive method that the SDP is expected to provide” (USAID Learning Lab, 2013). Included in the worksheet is the definition, explanation of linkage to long-term impact, unit of measurement, data source, and known data limitations associated with this indicator. The worksheet noted the importance “of supply availability to the success of any USG-assisted FP program,” and stated that the indicator should be used as a “high-level measure of how well a supply system is working” in order to “direct attention to where further analysis may be needed to guide program investments for supply chain strengthening” (USAID Learning Lab, 2013).

A report by the DFID Resource Centre for Sexual and Reproductive Health mentioned the need for improved measurements of stockouts as part of improving quality of care monitoring, noting that contraceptive shortages or stockouts negatively impact client perception of quality care (Price, date of publication unavailable). However, the author did not discuss the potential impacts of contraceptive stockouts beyond their influence on client perception of quality of care. The author also suggested the existence of stockouts as a quality of care indicator for community-based distribution programs.

Hillary Schwandt’s (2013) presentation at the 141st annual American Public Health Association meeting noted that programs “aiming to increase the contraceptive prevalence rate must address contraceptive supply stock out issues in order to ensure that the supply is available to meet the increase in demand” and described her development of a “summary measure that includes important information about the potential effect of a stock out,” including client flow and stockout information, as a means to create an aggregate measure of facility effectiveness in preventing stockouts. The presentation’s focus was on measuring the impact stockouts potentially have on clients, including “the potential number of new contraceptive adopters lost due to the stock out” (Schwandt, 2013). Schwandt goes on to state that the goal of more efficient measurement is allowing programs to “target those family planning facilities with the most widely damaging stock outs first, to strategically reduce the negative impact of stock outs in an informed order of priority.”

Supply chain management

Our search yielded only one document focused on supply chain management for reproductive health supplies. A 2012 report by the High Impact Practices in Family Planning group, sponsored by USAID, summarized a strategy for effective family planning as “developing effective supply chain management system for family planning so that women and men can choose, obtain, and use the contraceptive methods they want throughout their reproductive life” (HIP, 2012). They also state that developing supply chain management, “the set of activities involved in moving a product from the ultimate supplier to the ultimate customer,” is a means to reduce contraceptive stockouts, thereby fostering a climate of quality care (HIP, 2012).

Uganda-specific grey literature findings

In addition to literature on contraceptive stockouts around the world, we also searched specifically for grey literature on the prevalence and impact of contraceptive stockouts in Uganda. Our findings from the Uganda-specific grey literature were similar to our overall findings from the published and other grey literature. The articles did not address the impact of contraceptive stockouts and instead focused mainly on the high rates of unmet contraceptive need in Uganda, and the ongoing high prevalence of contraceptive stockouts.

Contraceptive stockouts in Uganda

A number of the documents reviewed provided background information on contraceptive access and use in Uganda. Levels of unmet need for modern contraceptives in Uganda are among the highest in sub-Saharan Africa (Guttmacher Institute, 2013). According to a 2013 brief published by the Guttmacher Institute, Uganda's total fertility rate is 6.2, whereas the desired total fertility rate based on individuals' ideal family size is 4.5. This difference between Ugandan women's actual and desired fertility rate highlights how difficult it is for women to meet their fertility desires. The unmet need for contraception is highest among poor, rural, and less educated Ugandan women (Guttmacher Institute, 2013). Uganda's maternal mortality ratio is estimated to be between 310 and 438 per 100,000 births, and complications of unsafe abortions cost the Ugandan health care system approximately \$14 million per year (Guttmacher Institute, 2013). Given these concerns, the Ministry of Health has committed to reducing unmet contraceptive need from 40% to 10% by 2022" (FP2020, 2013).

Research in Uganda has documented a number of challenges to increasing access to and use of modern contraceptives, including mixed government responses to family planning efforts and the cultural value of children. The Ugandan Ministry of Health is supportive of family planning efforts, as are a number of members of parliament who have emerged as family planning advocates (Leahy and Akitobi, 2009). However, others in the Ugandan government still maintain a pro-natalist stance and believe that a large population translates into economic strength (Leahy and Akitobi, 2009). Educational campaigns explaining the benefits of family planning have proven effective, and a report published by DFID asserted that "analysis of 15 years of Demographic and Health Survey data shows that men and women in Uganda who hear radio campaigns are significantly more likely to desire smaller families, and to have visited a health facility for family planning services, than men and women who have not heard it" (DFID, 2011).

Regardless of these advances, use of modern forms of contraceptives remains quite low in Uganda, particularly in rural areas. According to the Guttmacher Institute, "only 26% of married women and 43% of sexually active unmarried women use a modern method. Furthermore, one in three married women are not using contraceptives even though they do not want to become pregnant" (Guttmacher Institute, 2013). Fortunately, the contraceptive prevalence rate (CPR) is rising 1.3% per year (DFID, 2011). Although contraceptives are becoming more accessible, unmet need remains high, at 41% (MoH [Uganda], 2009).

In order to ensure women and men in Uganda have access to family planning, they must be "able to choose, obtain, and use quality contraceptives and other essential reproductive health products whenever s/he needs them" (MoH [Uganda], 2009). Contraceptive stockouts at health care facilities can impede women's access to the method of family planning she chooses/prefers, potentially leading to inconsistent use, gaps in use, or use of no method at all. A report published by John Snow, Inc. (JSI) states that "continued availability is essential to contraceptive use" (Raja, Wilbur and Blackburn, 2000). Stockouts may significantly limit women and men's ability to access and benefit from contraceptives.

Status of Stockouts

We reviewed nine reports from eight organizations on the prevalence and causes of contraceptive stockouts in Uganda. These reports described the status of stockouts in Uganda, and also described interventions taken to address contraceptive stockouts in Uganda or suggested action to address them in the future, which are discussed in the subsequent section of this review.

Past conflicting reports on the availability of reproductive health commodities led the Ministry of Health, HEPS-Uganda, UNFPA, and Health Action International Africa to undertake a study monitoring access to reproductive health supplies in Uganda to determine both the availability of reproductive health commodities and the underlying supply and demand management related causes of stockouts and overstocks of reproductive health commodities at the facility level (Kibira, Kalangwa, and Namugeere, 2012). The study's main findings regarding access to reproductive health supplies in Uganda were that stockouts persist and the causes are myriad. This study monitored the availability of stock at public, private, and NGO/mission facilities, and included a semistructured questionnaire to assess cost and availability of reproductive health commodities, and interviews with key informants including health facility stock managers. The authors found that public-sector facilities had the highest median availability of reproductive health commodities (61%), followed closely by NGO/mission facilities (59%), with private-sector facilities having a much lower median availability (30%) (Kibira, Kalangwa, and Namugeere, 2012). Public-sector facilities also had the most balanced availability across urban and rural locations, whereas NGO/mission and private-sector facilities had lower availability in rural areas than in urban areas. These findings indicate that there are "gaps in the supply side having grave impact on access to RH commodities" (Kibira, Kalangwa, and Namugeere, 2012).

The report by Kibira, et al. (2012) also included the most thorough assessment of the availability of different types of contraceptives at different types and locations of health care facilities and has the most detailed information regarding availability of a wide range of contraceptive methods. This report looked at contraceptive stockouts based on type of facility (public-sector facilities, private-sector facilities, and mission sector facilities) and location (urban and rural), but did not distinguish between different facility levels (e.g., HCII, HCIII, etc). Depo-Provera® was available at 74% of public facilities, 70% of private facilities, and 30% of mission facilities; male condoms were available at 79% of public facilities, 73% of private facilities, and 40% of mission facilities; female condoms were available at 13% of public facilities, 9% of private facilities, and 0% of mission facilities; Implanon® implants were available at 71% of public facilities, 12% of private facilities, and 30% of mission facilities, and Jadelle® implants had lower rates of availability across sectors, except in private facilities (18%); IUDs were available at 68% of public facilities, 24% of private facilities, and 20% of mission facilities⁷; combined oral contraceptive pills were available at 76% of public facilities, 67% of private facilities, and 30% of mission facilities, and progestin-only pills had lower rates of availability in all three sectors; emergency contraceptive pills were available at 61% of public facilities, 27% of private facilities, and 10% of mission facilities (Kibira, Kalangwa, and Namugeere, 2012). These findings show variable availability by method and facility, and indicate that in many cases women in Uganda do not have access to the full range of contraceptive methods at a single facility. As the authors note, "clients may not have a choice on a particular commodity to utilize due to inconsistent availability of all the commodities" (Kibira, Kalangwa, and Namugeere, 2012). The report findings highlight that there is the highest availability of family planning commodities in the public sector, but the authors emphasize that these facilities are not necessarily the most convenient for women seeking contraception. This data raises an important question about what types of facilities are the most appropriate and/or most convenient distribution channels for different types of contraceptives. This is an important area for future research to assess the perspective of women, policymakers, and providers.

⁷ Since the facility level was not stated in this report it is difficult to know which facilities should be providing LARC.

According to a report from DFID, the majority of health care in Uganda is provided through the private sector. Family planning services do not deviate from this trend; 65% of people seek contraceptives from private sources, tending to prefer getting “condoms and pills from shops” and injections, IUDs, implants, and sterilizations from NGOs and for-profit providers (DFID, 2011). Injectables are the most commonly used form of contraceptive in Uganda, comprising around 60% of modern contraceptive use (DFID, 2011). However, it is important to note that the popularity of injectables in Uganda may be a product of what is available, not necessarily because they are women’s top choice. The DFID report notes that prior to 2009, most NGOs received donor-funded contraceptive supplies through the National Medical Service. A 2009–2010 policy change led to a greater focus on public provision of contraceptive supplies, which led to many stockouts at NGOs (DFID, 2011). As the authors note, stockouts are both a supply and demand problem; stockouts not only have “serious consequences” for existing users (supply), but they can also reduce demand if women think they cannot access contraceptives (DFID, 2011).

Leahy and Akitobi (2009) conducted a case study of reproductive health supplies in Uganda, which included the review and analysis of policy documents relevant to reproductive health programs and supplies, and interviews with stakeholders. The authors noted that contraceptive stockouts in Uganda were “widely described as common” and cited logistics and procurement problems as the biggest contributors to stockouts (Leahy and Akitobi, 2009). For example, the authors found that logistics data, used for forecasting of contraceptive needs and long-term planning, were unreliable and poorly maintained by facilities (Leahy and Akitobi, 2009). Generally, reproductive health supply levels were adequate at the central level and stockouts most commonly occurred when “there is a breakdown in the distribution system between central and facility level” (Leahy and Akitobi, 2009). The authors also noted that a government official reported that “poor management of stock recently forced NMS [National Medical Stores] to destroy expired commodities worth 800 million shillings (\$375,000), of which roughly one-quarter were contraceptives” (Leahy and Akitobi, 2009). However, stockouts did also occur at the central level. The authors noted that in February 2009, the National Medical Stores experienced a stockout of one brand of implant and only had a stock of less than two weeks’ worth of Microgynon®, an oral contraceptive pill, with the next delivery of Microgynon stock not expected for two more months. Additionally, the stock levels of condoms, a second brand of implant, IUDs, and a second brand of pills, were all lower than the recommended supply (Leahy and Akitobi, 2009). However, the authors did not note the frequencies of these instances at the community or central level.

A report written by Raja, et al. of John Snow, Inc., in collaboration with USAID, noted that in 1998 and 1999, stockouts of contraceptives were repeatedly registered at the national, district, and facility levels. Although the authors did not provide specific numbers on the prevalence of contraceptive stockouts, they outlined a number of circumstances that contributed to contraceptive stockouts in Uganda. For example, the authors outlined the variety of causes of countrywide contraceptive stockouts in Uganda: “delays in country procurement clearances due to tighter implementation of the importation rules by the National Drug Authority; outstanding debt owed to National Medical Stores; donor dependent supply system which resulted in changes in product availability; restrictions on procurement and financial cuts faced by donors; and decentralization of health services resulting in lack of information available at the central level to plan for nationwide procurement” (Raja, Wilbur, and Blackburn, 2000). Other factors, such as inefficient product procurement, delayed ordering, and delayed processing of orders, led to stockouts at the district and facility levels (Raja, Wilbur, and Blackburn, 2000).

An assessment conducted by Pathfinder International in November and December 2010 found that 41 out of 69 facilities reviewed (59%) had experienced a stockout of at least one contraceptive method (Pathfinder, 2013a). Facilities most commonly had stockouts of condoms (50%), followed by injectables (12%), and pills (10%) (Pathfinder, 2013a). The report did not indicate the prevalence of IUD or implant stockouts, so it is unclear if these methods were available. Pathfinder noted that in early 2011, every facility assessed experienced a stockout of at least one method (Pathfinder, 2013a).

Current efforts to address contraceptive stockouts in Uganda

A number of the Uganda-specific reports returned by our search discussed current efforts to address contraceptive stockouts in Uganda. These reports suggested a number of potential approaches to addressing contraceptive stockouts and efforts that are already under way, including improved record keeping and data management to improve forecasting, strengthening coordination mechanisms for contraceptive stock, and improvements in the policy environment that affects contraceptive stockouts in Uganda. However, few of the reports provided evaluation data, although there was a documented reduction in stockouts when facilities with high rates of stockouts were targeted, though the report did not specify what was done to reduce stockouts in those facilities.

A report published by East, Central and Southern Africa Health Community (ECSA) highlighted inadequate commodity security and logistical problems as two factors leading to stockouts of family planning supplies, and noted that stockouts were a problem at both the facility and district levels (ECSA, 2011). This ECSA report published in 2011 indicated that, according to a JSI report, the most common cause of stockouts in some countries was a lack of central-level supplies, in contrast to findings from Leahy and Akitobi, published in 2009, discussed earlier, which stated that reproductive health supply levels were adequate at the central level. Echoing the findings of Cover, et al., which are summarized in the review of the published literature, the ECSA report indicated that even if injectables are in stock, there may be a stockout of syringes, impeding women from using the injectable unless they purchase their own syringes (ECSA, 2011). In order to address stockouts, the report recommended improving stock monitoring systems and shifting from the “push” system of distribution to the “pull” system, which allows communities to determine how much stock is needed based on community needs, rather than relying on a central quota system (ECSA, 2011).

An earlier report by Family Health International (FHI) mapped community-based distribution (CBD) programs in Uganda and noted that CBD is an important mechanism for the distribution of contraceptives. However, in spite of these programs' efficacy, only 26 out of Uganda's 80 districts (32.5%) had “active, financially supported” CBD programs (FHI, 2007). Most of the CBD programs offered only condoms and contraceptive pills, and programs in the Luwero, Nakasongla, and Nakaseke districts also offered the injectable depot medroxyprogesterone acetate (DMPA) (FHI, 2007). Through their research, FHI was able to identify key practices for successful CBD of family planning programs, which included, “local communities selecting CBD workers using documented criteria; initial two-week training of CBD workers using a curriculum that covers family planning, reproductive health, and other health issues; and regular supervision of CBD workers using monitoring checklists” (FHI, 2007). However, the authors noted that supplying CBD programs with contraceptives was a big challenge; district directors of health services and district health officers said they were unable to provide contraceptives to CBD programs because they did not have enough for their own health units (FHI, 2007). Thus, although CBD is an important mechanism for distributing contraceptives, their effectiveness is limited by the presence of contraceptive stock.

A number of reports, including those by Leahy and Akitoba, as well as Raja, et al. detailed earlier, highlighted the importance of record keeping and data management for the prevention of stockouts. Another report by USAID | DELIVER (2008b) noted that “there is very little use of essential data items to forecast commodities. Quantification is done by estimation of consumption in comparison with a visual inspection of the stock on hand” (USAID | DELIVER, 2008b). Given this observation, USAID | DELIVER was able to develop a District Action Plan to ensure widespread access to reproductive health supplies throughout the Mayuge District. A significant component of the plan involved implementing a logistic management information system (LMIS) to improve the accurate tracking of stock levels to prevent stockouts. However, there is no data available on whether or not the implementation of LMIS helped to address contraceptive stockouts in Uganda's Mayuge District.

Another report described existing efforts to use data to combat contraceptive stockouts. Pathfinder International partnered with the National Community of Women Living with AIDS and HIV (NACWOLA) to implement its Arise program in Northern and North Eastern Uganda in 2010. Arise aims to prevent HIV transmission by helping women to have healthy pregnancies or avoid unintended pregnancies. Arise works to strengthen the systems women rely on to increase access to high-quality integrated family planning and HIV services (Pathfinder 2013a). Arise used the data on prevalence of contraceptive stockouts to identify facilities that needed additional contraceptive supplies and to ensure that they received them. This led to a decrease in the prevalence of stockouts in the facilities included in the study by the end of December 2012 (Pathfinder, 2013a).

Uganda's Ministry of Health published its reproductive health commodity security strategic plan in 2009. This plan, which was designed to be implemented over the course of five years, claimed its success was contingent on the "creation of conducive policy and legal context; better coordination of actors, commitment and increased financing or capital for reproductive health commodities and strengthened commodities/supplies chain management system" (MoH, 2009). The Ministry of Health's plan emphasized the importance of moving from emergency response to stockouts to a more predictable, planned, and sustainable approach for ensuring the availability of contraceptives (MoH, 2009). This report noted that annual health sector performance reports have indicated "poor performance of the indicator on proportion of facilities without stock out of essential medicines, including reproductive health commodities." This report cited a weak policy environment for regulating, guiding, prioritizing, and financing the procurement of contraceptives as well as a lack of structure and weak mechanisms for the coordination of public and private sectors and weak commodities as factors that contribute to stockouts of essential medicines, including contraceptives. The report listed as one of its goals: "Increase the proportion of health facilities with NO stock outs of selected RH commodities to 80% by 2015." In order to reach this goal, the Ministry of Health outlined a number of strategies, as well as interventions and key activities:

- Improve the policy and regulatory environment that contribute to reproductive health commodity security in Uganda
- Mobilize adequate and sustainable resources for contraceptives, including advocating for an increase in budget allocation and spending for contraceptive and regularly developing accurate projections of demands for reproductive health commodities
- Strengthen coordination mechanisms for contraceptives at the national, district, and local levels

The Ministry of Health is working alongside USAID and UNFPA, along with several other development partners.

Conclusion

Our review of the published literature on contraceptive stockouts shows that despite stockouts being repeatedly cited as a barrier to access to contraception, there is little data on stockout prevalence; we also found no published literature that directly addressed or assessed the impact of contraceptive stockouts. Literature on the impact of stockouts of other key medicines in sub-Saharan Africa can provide some information on what types of impacts might be important, and we (and others) hypothesize that contraceptive stockouts likely have important impacts on health care providers, and may lead to a number of negative contraception and health outcomes for women and their families. More research is clearly needed to better understand and quantify the impact of contraceptive stockouts.

Our review of the grey literature on contraceptive stockouts again yielded little information on the impact of stockouts on women, their families, and service providers. Like the published literature, in many grey literature documents, contraceptive stockouts were cited as a factor that limit women's ability to access contraceptives, but there was no direct information assessing how or how much they impact women's access to and use of contraception. Some information exists on the prevalence of stockouts at facilities in a selection of countries, but the search results also suggest that clear and consistent ways to measure stockouts should be developed in order to allow for better cross-country comparisons. In many cases it was also not clear what methods *should* be available (based on policy or provider skill/training) at a specific facility or facility type. Rigorous research on the impact of stockouts on women, families, health care providers, and communities is needed both to design strategies to mitigate harmful effects of stockouts, and to mobilize political will and financial resources to reduce their occurrence.

The existing data from Uganda show that contraceptive stockouts are a common problem at the facility, community, and central levels, but different reports highlight different levels of the health system as the center of the problem. Available reports discuss the nature of stockouts in Uganda, including their frequency, the number of facilities experiencing them, and the contraceptive methods that are out of stock. These reports describe a range of factors that interfere with the distribution of reproductive health supplies from national centers as well as other circumstances that may contribute to a national shortage of contraceptives. The reports also highlight a number of causes of contraceptive stockouts, including procurement logistics and stock and data management challenges. Although this was not the focus of the review, the causes of contraceptive stockouts are similar to stockouts of other medicines: logistics and supply chain issues (e.g., unreliable and poorly maintained logistics data for forecasting of contraceptive needs and long-term planning; decentralized health services resulting in lack of information available at the central level to plan for nationwide procurement), policy and management issues (e.g., a weak policy environment for regulating, guiding, prioritizing, and financing the procurement of contraceptives; lack of structure and weak mechanisms for the coordination of public and private sectors), and financing issues (e.g., outstanding debt owed to National Medical Stores; donor dependent supply systems and donor procurement restrictions or funding cuts). The range of cited causes of contraceptive stockouts highlights the need for continued work to better understand the specific and most important causes of contraceptive stockouts in Uganda.

Stockouts prevent women and men from being able to choose the method that best suits their needs, potentially reducing contraceptive uptake, consistent use, and continuation, as well as client satisfaction with the method (which both impact uptake and continuation), and increasing unintended and mistimed pregnancy and poor women's and children's health outcomes associates with unintended and mistimed pregnancy. In addition to restricting women's choice of contraception, contraceptive stockouts can also lead to diminished confidence among clients and dissuade women from seeking contraceptives if they think they will be unable to access them, potentially reducing the likelihood that a woman will seek out a method of contraception. Additionally, contraceptive stockouts serve as a demotivating factor for health

care providers; no studies to date have measured the magnitude of the effect on providers or how this affects their ability to provide high-quality care. However, despite highlighting all of these negative impacts of contraceptive stockouts, the existing research does not address or estimate the impact of contraceptive stockouts on Ugandan women, and we found no information on what women do when they are faced with a stockout, or how health care providers and policymakers perceive and manage contraceptive stockouts.

As evidenced by our review, there is a need for new, innovative, and more in-depth research on contraceptive stockouts. Data on the impact of stockouts on women and health care providers is needed, as is information on policymakers' perceptions of stockouts and potential solutions. Future research should aim to better understand the scale of contraceptive stockouts and to determine how best to intervene to reduce contraceptive stockouts, including research on what types of facilities are the most appropriate and/or most convenient distribution channels for different types of contraceptives. Finally, research should be linked with advocacy campaigns and can serve as a critical tool for advocates working to reduce contraceptive stockouts, providing insight into how best to raise this issue with policymakers who can address policies and financing to reduce stockouts.

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Appendix I: List of organizations whose websites were searched for research on contraceptive stockouts

Christian Connections for International Health
DKT International Family Planning and HIV Prevention
Engender Health
ICON
Ipas
John Snow, Inc.
John Stover Futures Institute
Marie Stopes International
Marie Stopes Uganda
PATH
Pathfinder International
Population Council
Profamilia Colombia
Systems for Improved Access to Pharmaceuticals and Services (SIAPS)
United Nations Population Fund (UNFPA)
United States Agency for International Development (USAID)
WINGS
World Bank

Appendix II: Bibliography of review articles with abstracts (alphabetical order within section)

Contraceptive stockouts

Bruce J, Jain A. Improving the quality of care through operations research. *Progress in Clinical and Biological Research*. 1991;371:259–82.

This 10th chapter on improving quality of care through operations research (OR) provides 6 elements in the quality of care: choice of contraceptive methods, information given clients, technical competence, interpersonal relations, mechanisms to encourage continuity, and an appropriate mix of services. A table defines terms and a diagram shows that linkages to program effort and to the impact on client knowledge, satisfaction, and behavior. This family planning (FP) program tool focuses both on quality and the individual client's perspective. Evidence is reported on the impact of program effectiveness on improving quality of care (QC). It is hypothesized that improving QC serves individuals better and decreases fertility. Choice of methods is considered as important to improving QC because individuals pass through different life stages with varying needs, because multiple methods allow for switching, and a variety of methods insures that at least some methods will be available, when distribution is erratic. Based on experience in Hong Kong, India, South Korea, Taiwan, and Thailand, the addition of a method results in a net addition to contraceptive prevalence (CP). The IUD experiences in Taiwan and sterilization in India show the inadequacies of the 1 method FP program. Followup studies in Taiwan support the assertion that multiple methods improve continuation of contraceptive use. Other researchers have asserted that CP depends on the methods available and multiple service points. There is an exponential relationship between CP rate and availability for 72 countries, where a 1 point increase in availability yields a 3% increase in use. Every additional increase in method does not lead to a similar increase but is dependent on circumstances. 5 questions remain to be answered by managers. Why are we offering FP services? Individuals have the right to control the number and timing of children conditioned by public health and individual concerns. What is the standard of care the program wishes to offer? Has the program prepared adequately to offer this standard? Are clients receiving the intended QC? What is the impact of the care given? The role of OR in assisting managers in answering these questions is in providing diagnostic, feasibility, and impact studies. Recommendations are made regarding OR's future role in QC.

Burke HM, Ambasa-Shisanya C. Qualitative study of reasons for discontinuation of injectable contraceptives among users and salient reference groups in Kenya. *African Journal of Reproductive Health*. 2011 Jun;15(2):67–78.

Discontinuation of contraception is a major problem in Kenya. Even though they want to space or limit their births, over a quarter of contraceptive injectable users discontinue use of the method within 12 months of beginning use. Fourteen focus group discussions were conducted in Nyando District, Kenya among current contraceptive injectable users and their salient reference groups (e.g. husbands, mothers-in-law, community leaders, service providers) to understand why women discontinue using contraceptives (with a focus on injectables). Thematic analysis was performed using NVivo 8 software. Discontinuation of contraceptives in Nyando District occurs for logistical, social and medical reasons. Common reasons for discontinuation include side effects, husbands' opposition, provider and/or clinic restrictions, misconceptions about injectables, stock outs, and lack of cash to pay for family planning services. This research expands the literature by examining social influences on discontinuation by incorporating the perspectives of salient reference groups. The results suggest points of intervention for increasing continuation in this community and similar resource-poor settings.

Burke HM, Mueller MP, Packer C, Perry B, Bufumbo L, Mbengue D, et al. Provider acceptability of Sayana® Press: results from community health workers and clinic-based providers in Uganda and Senegal. *Contraception*. 2014;89(5):368–73.

BACKGROUND: Sayana® Press (SP), a subcutaneous formulation of depot medroxyprogesterone

acetate (DMPA) in Uniject™, has potential to be a valuable innovation in family planning (FP) because it may overcome logistic and safety challenges in delivering intramuscular DMPA (DMPA IM). However, SP's acceptability is unknown. We measured acceptability of SP among clinic-based providers (Senegal only) and community health workers.

STUDY DESIGN: This open-label observational study was conducted in clinics in three districts in Senegal and community-based services in two districts in Uganda. Providers administered SP to clients seeking reinjection of DMPA IM. We conducted in-depth interviews with 86 providers (52 in Senegal, 34 in Uganda) to assess their experiences providing SP to clients.

RESULTS: Almost all providers (84/86; 98%) preferred SP over DMPA IM. The main reason Uganda providers preferred SP was the prefilled/all-in-one design made preparation and administration easier and faster. Some providers thought the SP all-in-one feature may decrease stock outs (DMPA IM requires syringe and vial). Providers also felt clients preferred the shorter SP needle because it is less intimidating and less painful. Similarly, the main reasons Senegal providers preferred SP were its characteristics (prefilled/all-in-one) and client preference (especially less pain). They also saw a potential to increase access to FP, especially through community-based distribution. Providers from both countries reported SP introduction would be enhanced through client counseling and community engagement. Providers also said SP must be accessible, affordable and in stock.

CONCLUSION: Almost all providers preferred SP over DMPA IM. Provider recommendations should be considered during SP introduction planning.

IMPLICATIONS: We found that SP was acceptable to both clinic-based FP providers and community health workers. Providers' positive attitudes towards SP may facilitate introduction and uptake of this method.

Cernada GP, Rob AK, Ameen SI, Ahmad MS. A situation analysis of public family planning service delivery in Pakistan. *International Quarterly of Community Health Education*. 1993 Jan 1;14(1):21–52.

A nationally representative sample of 8 percent of the Government of Pakistan's primary family planning service facilities, the Family Welfare Centres (FWC), was carried out at the request of the Ministry of Population Welfare in mid-1992. The "situation analysis" approach used involved: 1) observation and inventory of services, facilities, supplies and record keeping reviews; 2) observation of interaction between service providers and FP clients at FWC's; 3) interviews with service providers; and 4) exit interviews with FP clients after service provision. This one-day on-site observation by teams of three interviewers provided a unique overview and baseline assessment of the availability of services, the staff functioning and the quality of service. Significant findings include a low caseload, inadequacies of facilities, some stockouts, lack of educational materials, insufficient outreach, unnecessary medical and social barriers to providing contraception as well as in some cases insufficient information to clients about contraindications to contraceptive usage and possible side-effects. The need to bolster in-service training and supervision is emphasized.

Cover J, Blanton E, Ndiaye D, Walugembe F, Lamontagne DS. Operational assessments of Sayana® Press provision in Senegal and Uganda. *Contraception*. 2014;89(5):374-8.

OBJECTIVE: Sayana® Press (SP) is a unique injectable contraceptive (depot medroxyprogesterone acetate, or DMPA) administered subcutaneously in the Uniject™ injection system.¹ SP simplifies the injection process; it requires no assembly of components and is easily disposable. This new technology appears to be well suited for community-based delivery of injectable contraception. The study objective was to evaluate SP management and administration in low-resource settings, focusing on how the delivery logistics, administration time, storage and waste-management requirements compare to the traditional intramuscular DMPA injectable (DMPA IM).

STUDY DESIGN: We conducted 58 semistructured interviews with clinic providers and community health workers in Senegal and Uganda to identify the merits, challenges and appeal of SP relative to DMPA IM.

RESULTS: Providers identified logistical challenges with the management and administration of DMPA IM, including stock outs, transportation, storage constraints, and, in a few instances, waste disposal. Most providers (between 63% and 88%, depending on the logistics issue) do not expect SP to either aggravate or solve those problems. Some envisioned that SP could facilitate supply management (5%), storage (11%) and waste disposal (22%). The all-in-one packaging of SP was perceived to reduce the incidence of mismatched supplies (syringes and vials), and its smaller size was expected to ease space constraints and reduce the frequency of safety box incineration.

CONCLUSION: Adding SP to the method mix is unlikely to have a profound impact on clinic operations but may lessen logistical problems related to supply, storage and waste management.

IMPLICATIONS: Community health workers and clinic providers who administer SP may see some modest improvements in service delivery logistics. Particularly in settings where service delivery logistical challenges are more pronounced, offering SP may facilitate injectable contraceptive delivery.

Hutchinson PL, Do M, Agha S. Measuring client satisfaction and the quality of family planning services: A comparative analysis of public and private health facilities in Tanzania, Kenya and Ghana. *BMC Health Services Research*. 2011;11(1):203.

BACKGROUND: Public and private family planning providers face different incentive structures, which may affect overall quality and ultimately the acceptability of family planning for their intended clients. This analysis seeks to quantify differences in the quality of family planning (FP) services at public and private providers in three representative sub-Saharan African countries (Tanzania, Kenya and Ghana), to assess how these quality differentials impact upon FP clients' satisfaction, and to suggest how quality improvements can improve contraceptive continuation rates.

METHODS: Indices of technical, structural and process measures of quality are constructed from Service Provision Assessments (SPAs) conducted in Tanzania (2006), Kenya (2004) and Ghana (2002) using direct observation of facility attributes and client-provider interactions. Marginal effects from multivariate regressions controlling for client characteristics and the multi-stage cluster sample design assess the relative importance of different measures of structural and process quality at public and private facilities on client satisfaction.

RESULTS: Private health facilities appear to be of higher (interpersonal) process quality than public facilities but not necessarily higher technical quality in the three countries, though these differentials are considerably larger at lower level facilities (clinics, health centers, dispensaries) than at hospitals. Family planning client satisfaction, however, appears considerably higher at private facilities - both hospitals and clinics - most likely attributable to both process and structural factors such as shorter waiting times and fewer stockouts of methods and supplies.

CONCLUSIONS: Because the public sector represents the major source of family planning services in developing countries, governments and Ministries of Health should continue to implement and to encourage incentives, perhaps performance-based, to improve quality at public sector health facilities, as well as to strengthen regulatory and monitoring structures to ensure quality at both public and private facilities. In the meantime, private providers appear to be fulfilling an important gap in the provision of FP services in these countries.

Hyttel M, Rasanathan JJK, Tellier M, Taremwa W. Use of injectable hormonal contraceptives: diverging perspectives of women and men, service providers and policymakers in Uganda. *Reproductive Health Matters*. 2012 Dec;20(40):148–57.

Abstract: The unmet need for family planning in Uganda is among the world's highest. Injectable contraceptives, the most available method, were used by only 14.1% of married women in 2011. Recent data suggest that the main reason for unmet need is not lack of access, but fear of and unacceptability of side effects. In this qualitative study, 46 women and men were interviewed about their experience of injectable contraceptive side effects and the consequences for their lives. Thirty-two family planning service providers and policymakers were also interviewed on their perceptions. While using injectables, many of the women experienced menstrual irregularities and loss of libido. Both women

and men experienced strained sexual relationships and expressed fear of infertility, often resulting in contraceptive discontinuation. Family planning service providers and policymakers often minimized side effects as compared to the risks of unintended pregnancy. Policymakers noted a lack of contraceptive alternatives and promoted family planning education to correct what they thought were misconceptions about side effects among both service providers and contraceptive users. Information alone, however, cannot diminish disturbances to social and sexual relationships. A common understanding of recognized side effects, not only with injectables but all contraceptives, is necessary if unmet need in Uganda is to be reduced.

Ketende C, Gupta N, Bessinger R. Facility-level reproductive health interventions and contraceptive use in Uganda. *International Family Planning Perspectives*. 2003 Sep;29(3):130–7.

CONTEXT: In Uganda, modern contraceptive use has recently increased in areas served by the Delivery of Improved Services for Health (DISH) project. Whether these increases are associated with facility-level factors is unknown, however.

METHODS: Data from the 1999 DISH Evaluation Surveys were used in multivariate logistic regressions to assess the independent relationships of five indicators of the family planning service environment with individual-level use of a modern contraceptive in rural and urban areas. The surveys consisted of a household questionnaire of 1,766 women of reproductive age and a facility module implemented in all health facilities that serve the sampled population.

RESULTS: After women's social and demographic characteristics were controlled for, none of the service environment factors was independently associated with current use of a modern method in rural areas. By contrast, in urban areas, the proximity of a private health facility (which likely reflects an increased availability of methods) was positively associated with current use (odds ratio, 2.1), as was the presence of a higher number (three or more) of DISH-trained service providers (1.7).

CONCLUSIONS: The presence of private health facilities was the factor most strongly associated with contraceptive use in urban areas, perhaps because they improved the availability of methods. Few other facility-level program inputs had significant effects.

Magadi MA, Curtis SL. Trends and determinants of contraceptive method choice in Kenya. *Studies in Family Planning*. 2003 Sep;34(3):149–59.

This study uses data from the 1989, 1993, and 1998 Kenya Demographic and Health Surveys to examine trends and determinants of contraceptive method choice in Kenya. The analysis, based on two-level multinomial regression models, shows that, over time, the use of modern contraceptive methods, especially long-term methods, is higher in urban than in rural areas, whereas the pattern is reversed for traditional methods. Use of barrier methods among unmarried women is steadily rising, but the levels remain disappointingly low, particularly in view of the HIV/AIDS epidemic in Kenya. One striking result from this analysis is the dramatic rise in the use of injectables. Of particular program relevance is the notably higher levels of use of injectables among rural women, women whose partners disapprove of family planning, uneducated women, and those less frequently exposed to family planning media messages, compared with their counterparts who have better access to services and greater exposure to family planning information.

Serbanescu F, Morris L, Stupp P, Stanescu A. The impact of recent policy changes on fertility, abortion, and contraceptive use in Romania. *Studies in Family Planning*. 1995 Apr;26(2):76–87.

A national household survey of 4,861 women aged 15-44 on reproductive health issues was conducted in Romania in 1993. The survey provided the opportunity to study the impact of policy changes by comparing selected aspects of fertility, abortion, and contraceptive use before and after the December 1989 revolution, when the laws restricting abortion and contraceptive use were abolished. After abortion became legal, the total fertility rate dropped to below replacement level, while the induced abortion rate doubled. Contraceptive prevalence increased 20 percent, but augmentation of the use of traditional methods, rather than the change in legislation, accounted for 70 percent of the increase. Limited sex

education and contraceptive information, mistrust and misinformation about modern methods, a lack of adequately trained providers, and a shortage or uneven distribution of contraceptive supplies are major reasons for the continued high rates of unintended pregnancy.

Other types of stockouts

Boyer S, Clerc I, Bonono C-R, Marcellin F, Bilé P-C, Ventelou B. Non-adherence to antiretroviral treatment and unplanned treatment interruption among people living with HIV/AIDS in Cameroon: Individual and healthcare supply-related factors. *Social Science and Medicine*. 2011 Apr;72(8):1383–92.

In low-income countries, health system deficiencies may undermine treatment continuity and adherence to antiretroviral therapy (ART) that are crucial for the success of large-scale public ART programs. In addition to examining the effects of individual characteristics, on non-adherence to ART and treatment interruption behaviors - i.e. treatment interruption for more than 2 consecutive days during the previous 4 weeks, this study aims to extend our knowledge on the role played by healthcare supply-related characteristics in shaping these two treatment outcomes. These effects are examined using multilevel logistic models applied to a sub-sample of 2381 ART-treated patients followed-up in 27 treatment centers in Cameroon (ANRS-EVAL survey, 2006-2007). Multivariate models show that factors common to both non-adherence and treatment interruption include binge drinking (at the individual-level) and large hospital size (at the healthcare supply-level). Among the individual factors, financial difficulties of paying for HIV-care are the major correlates of treatment interruption [Adjusted Odds Ratio (AOR) 95% confidence interval (CI) = 11.73(7.24-19.00)]. By contrast, individual factors associated with an increased risk of non-adherence include: having a main partner but not living in a couple compared to patients living in a couple [AOR(95%CI) = 1.51(1.14-2.01)]; experience of discrimination in the family environment [AOR(95%CI) = 1.74(1.14-2.65)]; a lack of regular meals [AOR(95%CI) = 1.93(1.44-2.57)], and switching antiretroviral drugs (ARV) regimen [AOR(95%CI) = 1.36(1.08-1.70)]. At healthcare facility-level, the main correlate of ART interruption was antiretroviral stock-outs [AOR(95%CI) = 1.76(1.01-3.32)] whereas the lack of psychosocial support from specialized staff and lack of task-shifting to nurses in medical follow-up were both associated with a higher-risk of non-adherence [respective AOR (95%CI) = 2.81(1.13-6.95) and 1.51(1.00-3.40)]. Results reveal different patterns of factors for non-adherence and treatment interruption behaviors. They also suggest that psychosocial support interventions targeted at the individual patient-level will not be sufficient to achieve favorable treatment outcomes if not combined with interventions focused on strengthening health systems, including appropriate drug supplies and human resources policies, as well as sustainable and equitable financing mechanisms.

Harries AD, Schouten EJ, Makombe SD, Libamba E, Neufville HN, Some E, et al. Ensuring uninterrupted supplies of antiretroviral drugs in resource-poor settings: an example from Malawi. [Bull World Health Organ](#). 2007 Feb;85(2):152–5.

PROBLEM: Drug procurement and distribution practices are weak in many resource-poor countries, and are a major reason for lack of access to medicines. With many countries scaling up antiretroviral therapy (ART), it is vital to avoid interrupted drug supplies, which would lead to drug resistance and treatment failure.

APPROACH: Malawi has adapted a model, based on that adopted by the country's Tuberculosis Control Programme, to allow rational ART drug forecasting.

LOCAL SETTING: The model includes a focus on one standardized first-line ART regimen; a "push system" and "ceilings" for first-line ART drugs for facilities; use of starter pack and continuation pack kits; quarterly monitoring of patient outcomes and ART drug stocks at facility level; provision of a three-month buffer stock of ART drugs at facility level; and use of a procurement and distribution system outside central medical stores.

LESSONS LEARNED: The focus on a single first-line regimen, "ceilings" for first-line ART drugs and quarterly data collections to calculate drug needs (for new and follow-up patients, respectively), as well as

the use of an independent procurement facility, allow drug orders to be made 6-9 months ahead. These measures have so far ensured that there have been no ART drug stock-outs in the country.

Hensen B, Paintain LS, Shretta R, Bruce J, Jones C, Webster J. Taking stock: provider prescribing practices in the presence and absence of ACT stock. *Malaria Journal*. 2011 Aug 3;10(1):218.

BACKGROUND: Globally, the monitoring of prompt and effective treatment for malaria with artemisinin combination therapy (ACT) is conducted largely through household surveys. This measure; however, provides no information on case management processes at the health facility level. The aim of this review was to assess evidence from health facility surveys on malaria prescribing practices using ACT, in the presence and absence of ACT stock, at time and place where treatment was sought.

METHODS: A systematic search of published literature was conducted. Findings were collated and data extracted on proportion of patients prescribed ACT and alternative anti-malarials in the presence and absence of ACT stock.

RESULTS: Of the 14 studies identified in which ACT prescription for uncomplicated malaria in the public sector was evaluated, just six, from three countries (Kenya, Uganda and Zambia), reported this in the context of ACT stock. Comparing facilities with ACT stock to facilities without stock (i) ACT prescribing was significantly higher in all six studies, increasing by a range of 21.3% in children < 5 yrs weighing \geq 5 kg ($p < 0.001$; Kenya 2006) to 51.7% in children \geq 10 kg ($p < 0.001$; Zambia 2006); (ii) SP prescribing decreased significantly in five studies, by a range of 14.4% ($p < 0.001$; Kenya 2006), to 46.3% ($p < 0.001$; Zambia 2006); (iii) Where quinine was a reported alternative, prescriptions decreased in five of the six studies by 0.1% ($p = 1.0$, Kenya 2010) to 10.2% ($p < 0.001$; Zambia 2006). At facilities with no ACT stock on the survey day, the proportion of febrile patients prescribed ACT was < 10% in five of the nine target groups included in the six studies, with the proportion prescribed ACT ranging from 0 to 28.4% (Uganda 2007).

CONCLUSIONS: Prescriber practices vary based on ACT availability. Although ACT prescriptions increased and alternative anti-malarials prescriptions decreased in the presence of ACT stock, ACT was prescribed in the absence, and alternative anti-malarials were prescribed in the presence of, ACT. Presence of stock alone does not ensure that treatment guidelines are followed. More health facility surveys, together with qualitative research, are needed to understand the role of ACT stock-outs on provider prescribing behaviours and preferences.

Kranzer K, Ford N. Unstructured treatment interruption of antiretroviral therapy in clinical practice: a systematic review. *Tropical Medicine and International Health*. 2011 Oct 1;16(10):1297–313.

OBJECTIVE: To characterize the frequency, reasons, risk factors, and consequences of unstructured anti-retroviral treatment interruptions.

METHOD: Systematic review.

RESULTS: Seventy studies were included. The median proportion of patients interrupting treatment was 23% for a median duration of 150 days. The most frequently reported reasons for interruptions were drug toxicity, adverse events, and side-effects; studies from developing countries additionally cited treatment costs and pharmacy stock-outs as concerns. Younger age and injecting drug use was a frequently reported risk factor. Other risk factors included CD4 count, socioeconomic variables, and pharmacy stock outs. Treatment interruptions increased the risk of death, opportunistic infections, virologic failure, resistance development, and poor immunological recovery. Proposed interventions to minimize interruptions included counseling, mental health services, services for women, men, and ethnic minorities. One intervention study found that the use of short message service reminders decrease the prevalence of treatment interruption from 19% to 10%. Finally, several studies from Africa stressed the importance of reliable and free access to medication.

CONCLUSION: Treatment interruptions are common and contribute to worsening patient outcomes. HIV/AIDS programmes should consider assessing their causes and frequency as part of routine

monitoring. Future research should focus on evaluating interventions to address the most frequently reported reasons for interruptions.

Medley AM, Kennedy CE. Provider Challenges in Implementing Antenatal Provider-Initiated HIV Testing and Counseling Programs in Uganda. *AIDS Education and Prevention*. 2010 Apr 1;22(2):87–99.

While provider-initiated HIV testing and counseling (PITC) programs are being increasingly implemented in antenatal care settings, there is scant information about the specific challenges providers face when offering these services. Through qualitative interviews with 30 HIV antenatal care providers from 10 clinics in central Uganda, we sought to understand specific challenges Ugandan providers face in implementing antenatal PITC programs, including how these challenges impact prevention of mother-to-child HIV transmission programs. Counseling-specific challenges included counseling discordant couples, incomplete follow-up of HIV-infected clients, low rates of both male involvement and HIV serostatus disclosure, and inadequate training and support to carry out counseling duties. Health system challenges included lack of adequate space for counseling, frequent "stock-outs" of supplies, shortages of both counselors and lab personnel, and inadequate referral services. These challenges must be addressed in order to optimize the success of PITC programs at providing universal access to HIV testing and counseling services.

Muhamadi L, Nsabagasani X, Tumwesigye MN, Wabwire-Mangen F, Ekström A-M, Peterson S, et al. Inadequate pre-antiretroviral care, stock-out of antiretroviral drugs and stigma: Policy challenges/bottlenecks to the new WHO recommendations for earlier initiation of antiretroviral therapy (CD < 350 cells/ μ L) in eastern Uganda. *Health Policy*. 2010 Oct;97(2–3):187–94.

OBJECTIVE: This study explores reasons for late ART initiation among known HIV positive persons in care from a client/caretaker perspective in eastern Ugandan where ART awareness is presumably high yet AIDS related mortality is a common function of late initiation of ARVs.

METHODS: In Iganga, Uganda we conducted in-depth interviews with clients who started ART at 50-200 CD4 cells/microL and those initiated very late at CD4 < 50 cells/microL. Focus-group discussions were also conducted with caretakers of clients on ART. Content analysis was performed to identify recurrent themes.

RESULTS: ARV stock-outs, inadequate pre-antiretroviral care and lack of staff confidentiality were system barriers to timely ART initiation. Weak social support and prevailing stigma and misconceptions about ARVs as drugs designed to kill, cause cancer, infertility or impotence were other important factors.

CONCLUSION: If the new WHO recommendations (start ART at CD4 350 cells/microL) should be feasible, PLHIV/communities need sensitization about the importance of regular pre-ARV care through the local media and authorities. The ARV supply chain and staff attitudes towards client confidentiality must also be improved in order to encourage timely ART initiation. PLHIV/communities should be sensitized about drug package labeling and the use and importance of ARVs. Stronger social support structures must be created through public messages that fight stigma, enhance acceptance of PLHIV and encourage timely ART initiation.

Penfold S, Shamba D, Hanson C, Jaribu J, Manzi F, Marchant T, et al. Staff experiences of providing maternity services in rural southern Tanzania - a focus on equipment, drug and supply issues. *BMC Health Services Research* . 2013;13:61.

BACKGROUND: The poor maintenance of equipment and inadequate supplies of drugs and other items contribute to the low quality of maternity services often found in rural settings in low- and middle-income countries, and raise the risk of adverse patient outcomes through delaying care provision. We aim to describe staff experiences of providing maternal and neonatal care in rural health facilities in Southern Tanzania, focusing on issues related to equipment, drugs and supplies.

METHODS: Focus group discussions and in-depth interviews were conducted with different staff cadres from all facility levels in order to explore experiences and views of providing maternity care in the context

of poorly maintained equipment, and insufficient drugs and other supplies. A facility survey quantified the availability of relevant items.

RESULTS: The facility survey, which found many missing or broken items and frequent stock outs, corroborated staff reports of providing care in the context of missing or broken care items. Staff reported increased workloads, reduced morale, difficulties in providing optimal maternity care, and carrying out procedures with potential health risks to themselves as a result.

CONCLUSIONS: Inadequately stocked and equipped facilities compromise the health system's ability to reduce maternal and neonatal mortality and morbidity by affecting staff personally and professionally, which hinders the provision of timely and appropriate interventions. Improving stock control and maintaining equipment could benefit mothers and babies, not only through removing restrictions to the availability of care, but also through improving staff working conditions.

Wasunna B, Zurovac D, Goodman CA, Snow RW. Why don't health workers prescribe ACT? A qualitative study of factors affecting the prescription of artemether-lumefantrine. *Malaria Journal*. 2008;7:29.

BACKGROUND: Kenya recently changed its antimalarial drug policy to a specific artemisinin-based combination therapy (ACT), artemether-lumefantrine (AL). New national guidelines on the diagnosis, treatment and prevention were developed and disseminated to health workers together with in-service training.

METHODS: Between January and March 2007, 36 in-depth interviews were conducted in five rural districts with health workers who attended in-service training and were non-adherent to the new guidelines. A further 20 interviews were undertaken with training facilitators and members of District Health Management Teams (DHMTs) to explore reasons underlying health workers' non-adherence.

RESULTS: Health workers generally perceived AL as being tolerable and efficacious as compared to amodiaquine and sulphadoxine-pyremethamine. However, a number of key reasons for non-adherence were identified. Insufficient supply of AL was a major issue and hence fears of stock outs and concern about AL costs was an impediment to AL prescription. Training messages that contradicted the recommended guidelines also led to health worker non-adherence, compounded by a lack of follow-up supervision. In addition, the availability of non-recommended antimalarials such as amodiaquine caused prescription confusion. Some healthworkers and DHMT members maintained that shortage of staff had resulted in increased patient caseload affecting the delivery of the desirable quality of care and adherence to guidelines.

CONCLUSION: The introduction of free efficacious ACTs in the public health sector in Kenya and other countries has major potential public health benefits for Africa. These may not be realized if provider prescription practices do not conform to the recommended treatment guidelines. It is essential that high quality training, drug supply and supervision work synergistically to ensure appropriate case management.

How to address stockouts

Mikkelsen-Lopez I, Shango W, Barrington J, Ziegler R, Smith T, deSavigny D. The challenge to avoid anti-malarial medicine stock-outs in an era of funding partners: the case of Tanzania. *Malaria Journal*. 2014;13(1):181.

BACKGROUND: Between 2007 and 2013, the Tanzanian public sector received 93.1 million doses of first-line anti-malarial artemisinin-based combination therapy (ACT) in the form of artemether-lumefantrine entirely supplied by funding partners. The introduction of a health facility ACT stock monitoring system using SMS technology by the National Malaria Control Programme in mid 2011 revealed a high frequency of stock-outs of ACT in primary care public health facilities. The objective of this study was to determine the pattern of availability of ACT and possible causes of observed stock-outs across public health facilities in Tanzania since mid-2011.

METHODS: Data were collected weekly by the mobile phone reporting tool SMS for Life on ACT availability from over 5,000 public health facilities in Tanzania starting from September 2011 to December 2012. Stock data for all four age-dose levels of ACT across health facilities were summarized and supply of ACT at the national level was also documented.

RESULTS: Over the period of 15 months, on average 29% of health facilities in Tanzania were completely stocked out of all four-age dose levels of the first-line anti-malarial with a median duration of total stock-out of six weeks. Patterns of total stock-out by region ranged from a low of 9% to a high of 52%. The ACT stock-outs were most likely caused by: a) insufficient ACT supplies entering Tanzania (e.g. in 2012 Tanzania received 10.9 million ACT doses compared with a forecast demand of 14.4 million doses); and b) irregular pattern of ACT supply (several months with no ACT stock).

CONCLUSION: The reduced ACT availability and irregular pattern of supply were due to cumbersome bureaucratic processes and delays both within the country and from the main donor, the Global Fund to Fight AIDS, Tuberculosis and Malaria. Tanzania should invest in strengthening both the supply system and the health information system using mHealth solutions such as SMS for Life. This will continue to assist in tracking ACT availability across the country where all partners work towards more streamlined, demand driven and accountable procurement and supply chain systems.

Wagenaar BH, Gimbel S, Hoek R, Pfeiffer J, Michel C, Manuel JL, et al. Stock-outs of essential health products in Mozambique - longitudinal analyses from 2011 to 2013. *Tropical Medicine and International Health*. 2014. doi: 10.1111/tmi.12314.

OBJECTIVES: To assess the relationship between health system factors and facility-level EHP stock-outs in Mozambique.

METHODS: Service provisions were assessed in 26 health facilities and 13 district warehouses in Sofala Province, Mozambique, from July to August in 2011-2013. Generalised estimating equations were used to model factors associated with facility-level availability of essential drugs, supplies and equipment.

RESULTS: Stock-out rates for drugs ranged from 1.3% for oral rehydration solution to 20.5% for Depo-Provera and condoms, with a mean stock-out rate of 9.1%; mean stock-out rates were 15.4% for supplies and 4.1% for equipment. Stock-outs at the district level accounted for 27.1% (29/107) of facility-level drug stock-outs and 44.0% (37/84) of supply stock-outs. Each 10-km increase in the distance from district distribution warehouses was associated with a 31% (CI: 22-42%), 28% (CI: 17-40%) or 27% (CI: 7-50%) increase in rates of drug, supply or equipment stock-outs, respectively. The number of health facility staff was consistently negatively associated with the occurrence of stock-outs.

CONCLUSIONS: Facility-level stock-outs of EHPs in Mozambique are common and appear to disproportionately affect those living far from district capitals and near facilities with few health staff. The majority of facility-level EHP stock-outs in Mozambique occur when stock exists at the district distribution centre. Innovative methods are urgently needed to improve EHP supply chains, requesting and ordering of drugs, facility and district communication, and forecasting of future EHP needs in Mozambique. Increased investments in public-sector human resources for health could potentially decrease the occurrence of EHP stock-outs.