COLLEGE OF MEDICINE AND HEALTH SCIENCES
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Associated factors with stock out for modern contraceptives in Health Facilities in Rwanda

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By:Marie Claire IRYANYAWERA
Reg Number: 2134171

Supervisor: Prof. Cyprien MUNYANSHONGORE
Co-Supervisor: Albert NDAGIJIMANA

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Marie Claire IRYANYAWERA

College of Medicine and Health Sciences

School of Public Health

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DECLARATION

I, Marie Claire IRYANYAWERA, hereby declare that the thesis has been written by me without any external unauthorized help, that it has been neither presented to any institution for evaluation nor previously published in its entirely or in parts. Any parts, words or ideas of the thesis, however limited, which are quoted from or based on other sources, have been acknowledged as such without exception.

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ABSTRACT

Background: Family Planning (FP) and related issues are often highly sensitive and the positive progress depends on multiple factors that include availability of contraceptives, demand, access and quality of FP information and services, political and financial commitment, availability and use of reliable data on FP. In Rwanda and in different other developing countries, the associated factors with stock out of FP program are not well documented.

Methods: This was asecondary data analysis; descriptive cross-sectional and analytical study which assessed factors associated with the stock out of modern contraceptives in Rwandan health facilities for the period of December 2014. Multivariate analysis was used to determine factors statistically associated with stock-out of modern contraceptives. Results were considered significant at 95% CI, with p-value of 0.05.

Results: The survey was conducted in 174 health facilities, including 130 health centers, 40 district hospitals and 4 referral hospitals. Stock out of FPcommodities on the day of surveywas observed in 27.6% of health facilities (48); while within the last six months, it was observed in 44.3% of health facilities (77). None of the assumed factors was associated with stock-outon the day of the survey, while the level of health facility was associated with stock-out within six months prior to the survey (p=0.026).Health Centers were the most stocked out compared to District Hospitals and Referral Hospitals.

Conclusion: The prevalence of stock out of FP commodities in Rwanda was generally low compared to other countries in the region, but there is still more to do in order to decrease the unmet need of FP due to unavailability of the methods when needed.

Good practices like availability of trained staff to provide FP services and regular monitoring and supervision should be kept to ensure the compliance with policies and guidelines in place; thus right-based quality services to the clients. No contraceptive should miss at the health facility as per service package requirement, regardless of the low/no client demand.

RESUME

Contexte: La planification familiale (PF) et les questions connexes sont souvent très sensibles et le progrès positif dépend de multiples facteurs, dont la disponibilité des contraceptifs, la demande, l'accès et la qualité d'informations en matière de FP, l'engagement politique et financier, la disponibilité et l'utilisation de données fiables sur la PF. Au Rwanda et dans différents pays en développement, les facteurs associés à la rupture de stocks des produits contraceptifs ne sont pas bien documentés.

Méthodes: Ce travail s'est focalisé sur une analyse secondaire des données collectées en vue d'une étude descriptive, avec comme objectif d'évaluer les facteurs associés avec la rupture de stock en contraceptifs modernes dans les établissements de santé du Rwanda pour la période de Décembre 2014. L'analyse multivariée a été utilisée pour déterminer les facteurs statistiquement associés à une rupture de stock encontraceptifs modernes. Les résultats ont été considérés comme significatifs à 95% IC, avec la valeur p de 0,05.

Résultats: L'enquête a été menée dans 174 établissements de santé, y compris 130 centres de santé, 40 hôpitaux de district et 4 hôpitaux de référence. La rupture de stock en produits de PF au jour de l'enquête a été observée dans 27.6% des établissements de santé (48); tandis que dans les six derniers mois, il a été observé dans 44.3% des établissements de santé (77). Aucun des facteurs pris en charge a été associé à la rupture de stock au jour de l'enquête, alors que le niveau de l'établissement de santé a été associé à la rupture de stock dans les six mois précédant l'enquête (p = 0,026). Les Centres de santé étaient les plus affectés en rupture de stock par rapport aux hôpitaux de districts et de référence.

Conclusion: La prévalence en rupturede stock sur les produits de PF au Rwanda était généralement faible par rapport à d'autres pays de la région, mais il y a encore beaucoup à faire afin de réduire les besoins non satisfaits de la PF en raison de l'indisponibilité des méthodes en cas de besoin.

Les bonnes pratiques telles que la disponibilité de personnel qualifié pour fournir des services de PF et le suivi et la surveillance régulière doivent être maintenus pour assurer la conformité aux politiques et lignes directrices en place; ainsi fondée sur les droits des services de qualité aux clients. Aucun contraceptif ne devrait manquer dans l'établissement de santé selon l'exigence de paquet de service, quel que soit la faible demande en certains produits par les clients.

DEDICATION

I dedicate this work to my lovely husband Reverend Eugene NSHOGOZABAHIZI, to whom I am eternally grateful for his great moral support, love and encouragement during my studies. I dedicate also this work to our children, for their patience in my limited presence at home during my studies.

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May God Bless you all.

ACRONYMS AND ABBREVIATIONS

CMHS: College of Medicine and Health Sciences
ESARO: Eastern and Southern Africa Region
DHS: Demographic and Health Survey
FP: Family Planning
FWCs: Family Welfare Centres
GPRHCS: Global Program to enhance Reproductive Health Commodity Security
HF: Health Facility
HIV: Human Immuno-deficiency Virus
ICT: Information Communication and Technology
IRB Institutional Review Board
mCPR: Modern method Contraceptive Prevalence Rate
MDGs: Millennium Development Goals
MOH: Ministry of Health
RH: Reproductive Health
RHCS: Reproductive Health Commodity Security
SD: Standard Deviation
SDP: Service Delivery Point
SPH: School of Public Health
SPSS: Statistical Package for Social Sciences
SRH: Sexual and Reproductive Health
TFR: Total Fertility Rate
WHO: World Health Organization
UR: University of Rwanda

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I. INTRODUCTION

1.1 Definition of key concepts

Family Planning (FP): Essentially,FPimplies enabling individuals and couples to attain the desired number, spacing and timing of their children, through the use of modern or traditional (also called natural) contraceptive methods(1).

Contraceptive prevalence rate: The proportion of women of reproductive age who are using (or whose partner is using) a contraceptive method at a given point in time(2).

Unmet need for FP: It is defined as the percentage of women of reproductive age, either married or in a union, who have an unmet need for FP. Women with unmet need are those who want to stop or delay childbearing but are not using any method of contraception(3).

Maternal mortality rate: The death of a woman while pregnant, childbirth, or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes(4).

Total Fertility rate: The average number of children born per woman over a lifetime given current age-specific fertility rates and assuming no female mortality during reproductive years. TFRs are generally computed as the sum of age-specific fertility rates defined over five-year intervals(5).

Out of Stock (OOS):A situation in which the demand or requirement for an item cannot be fulfilled from the current inventory(6)**.**

1.2 Problem formulation

Universal access to FP is recognized as a human right, central to gender equality and women's empowerment, and also considered as a key factor in reducing poverty and achieving the Sustainable Development Goals (SDGs), especially the Goal 3 "*Ensure healthy lives and promote well-being for all at all ages*; in its target 3.7 (by 2030 ensure universal access to sexual and reproductive health care services, including for FP, information and education, and the integration of reproductive health into national strategies and programmes). FP has proven benefits in terms of gender equality, maternal health, child survival and HIV prevention. Moreover, improving access to modern contraception for adolescents can increase their opportunities throughout their lives, starting with

longer education, fewer pregnancies, a later and healthier start to childbearing, and more opportunities to engage in income-producing activities.

FP and related issues are often highly sensitive and progress depends on multiple factors that include availability of contraceptives, demand, access and quality of FP information and services, political and financial commitment and availability and use of reliable data on FP(7).

FP has been one of the development and public health successes of 20th century. It has saved many lives, changed the face of the world, and transformed the lives of women. Since the International Conference on Population and Development [ICPD] in 1994, freedom to decide about the number and timing of children's births is recognized as a vital component of reproductive health and as a human right(7).

Currently, the global contraceptive prevalence rate (CPR) for women of reproductive age married/in union is about 63 per cent. The number of married women or in-union women who have an unmet need for modern contraception changed from 222 million in 2012 and 133 million in 2015(8).

However, critical challenges remain; a major one being inequity to access at various levels. For instance, the use of modern contraception varies among regions and countries significantly. The vast majority of unintended pregnancies worldwide are a result of contraceptive nonuse, inconsistent use, or a reliance on ineffective methods of contraception.

In sub-Saharan Africa, Contraceptive Prevalence Rate (CPR) is the lowest of any region at 22 per cent and so-called 'unmet need' is highest at 25 per cent. Furthermore, there are large disparities within countries related to poverty, age, gender, geographical location and marital status. Women with low income have less access to FP services than their counterparts with higher income level. Rural areas tend to have poorer populations compared to those in urban locations. Moreover, there are a number of groups (such as adolescents, the urban poor, rural communities, and people living with HIV) which require particular attention to ensure their access to FP and SRH services as when compared to the general population they often face a combination of: access barriers, leading to high rates of unintended pregnancy, increased risk of HIV and STIs, and higher levels of unmet need(7).

With regard to the estimated 260 million current users of modern contraception in developing countries, the challenge is to maintain current use and ensure individuals are using the method of their choice. Users can find themselves with an unmet need when they discontinue use and do not immediately adopt another method. Reasons cited in studies for discontinuation includes

dissatisfaction with current method, poor quality service, among others. A strong quality service/supply focus (broad method mix), absence of provider bias, appropriate distribution of FP services can be effective in meeting the FP needs of this group.

The Government of Rwanda is currently implementing programs addressing maternal and neonatal morbidity and mortality, resulting in a steady decrease in the maternal and neonatal mortality rates(9). Maternal mortality has been reduced in Rwanda from 476/100,000 in 2010 to 210/100,000 in 2015 and MDGs were attained. In addition, the total fertility rate was reduced from 4.6 in 2010 up to 4.2 in 2015(10). In married women contraceptive prevalence rate (mCPR) has slightly increased from 45%(11) to 48% in 2015 (10).

In the latest FP2020 annual estimates of core indicators for 2013-2014, Rwanda is among the five FP2020 focus countries that has shown an increase of demand satisfied from 63.4% in 2012 to 67% in 2015(12,13).

This achievement is the result of different strategies undertaken by the Ministry of Health. Accessibility was facilitated by making services free, increasing the number of health centers, and task shifting provision of contraceptive methods to both lower-level facilities and Community Health Workers. Where facilities are run by organizations that don't provide modern methods, administrative offices were made available near health facilities to provide them. The Ministry of Health (MoH) logistics management and supply chain system assessment of 2011 indicated that there was no significant stock out of RH commodities.

However, theService Delivery Points (SDP) survey which was conducted in 2014 has shown stock out in some health facilities. That survey was conducted in 46 target countries globally as part of the second phase starting from 2013 and Rwanda is among the 15 target countries in Easten and Southern Africa Region (ESARO). The survey has been expanded to cover theservice delivery related issues to ensure good Reproductive Health (RH) programmes and also has a client satisfaction component that obtained the views of clients about the services offered. A total of 174 health facilities were surveyed in this study, made up of 130 primary care facilities (health centres), 40 secondary care facilities (district hospitals) and 4 tertiary facilities (referral hospitals) spread across the five provinces of Rwanda, representing a 95% coverage of the computed sample size of 184 health facilities. Generally speaking, Kigali City contributed to the least (10.3%) number of surveyed facilities while Western province contributed the highest (24.7%). In terms of rural-urban

representation, 25% were urban with Kigali and Western regions contributing the most urban facilities (33% and 26% respectively) while 75% were rural with Kigali contributing the least rural facilities (3%) and the rest fairly evenly distributed across the other provinces. As far as the distribution of health facilities by ownwership/management is concerned, the majority (72%) of the sampled health facilities were government owned, more than half (53%) of them drawn from the Southern and Eastern provinces. All except three of the non-governmental health facilities were faith-based with Western province contributing the largest (38%) proportion. The faith-based health facilities provided FP services through health posts. The prevalence of availability of FPcommodities was assessed and was showed to be high because28.7% of all health facilities assessed had stockout and predominant in tertiary hospital with 75% of referral hospitals with stock out. The high prevalence of stock out was also showed very high in Southern health facilities with 42.5%(14). This is a very crucial problem for the success of FP program in Rwanda considering the fact that " the availability of commodities" is one component of the quality of the health programme like FP programme. Therefore, it is necessary to identify factors associated with this stock-out in different health facilities in order to guide the Ministry of Health (MoH) and partners in decision making to improve the situation of FP in Rwanda.

Thus, this study has the following research question:***What are the associated factors with the stock-out of contraceptives in health facilities in Rwanda?***

1.3.Literature review

The world's population of 6.8 billion in 2009 was expected to grow by another 2.4 billion to reach 9.2 billion in 2050(15). The century from 1950 to 2050 will have witnessed the highest global population growth rate ever, the largest voluntary fall in the global population growth rate ever, and the most enormous demographic shift ever between the more developed and less developed region(16). In 2012, an estimated 645 million women in the developing world were using modern methods 42 million more than in 2008. About half of this increase was due to population growth. Serving all women in developing countries who currently have an unmet need for modern methods would prevent an additional 54 million unintended pregnancies, including 21 million unplanned births, 26 million abortions (of which 16 million would be unsafe) and seven million miscarriages; this would also prevent 79,000 maternal deaths and 1.1 million infant deaths(8). Sub-Saharan Africa has the highest average fertility rate in the world. In 2009, the total fertility rate(TFR) or the average number of births per woman was 5.1(17).

Several studies showed the low use of modern contraceptives in developing counties especially in African countries. Modern contraceptive use persists to be low in most African countries where fertility, population growth, and unmet need for FP are high(18).

In a study done in Tanzania, the availability of modern contraceptives was generally low in health facilities assessed. Overall availability of contraceptives from July 2008 –June 2009 was 36%, while in July 2009 –June 2010 was 42% and July 2010-March 2011 was 45%. In all three years condom and hormonal contraceptives were the only items that were available in relatively large quantity (40%) and (40%), against the rest (8%) $p<0.004$(19).

Different factors were linked with limited availability of modern contraceptives in different countries like this cross-sectional study done in Armenia, where study results show limited availability (18%) of the appropriate contraceptive method mix in all types of facilities participating in the study and availability of these contraceptives was high in urban health facilities(61%) than in rural health facilities(3%)(20). In a study done in Mali 46% of health facilities included in the study had at least stock-out of one of modern contraceptives and factors associated with this stock-out were not having system to collect information on contraceptives provided and having more staff trained in FP services in last three years(21). In 2011 in a study done in 33 public-sector facilities in Pikine and Guediawaye districts of the Dakar region in Senegal, stock-out for injectables and implants was 43% and 83% of the year, respectively. Developing the informed push distribution model (IPM) in health facilities decreased the stock-out up to 2%(22).

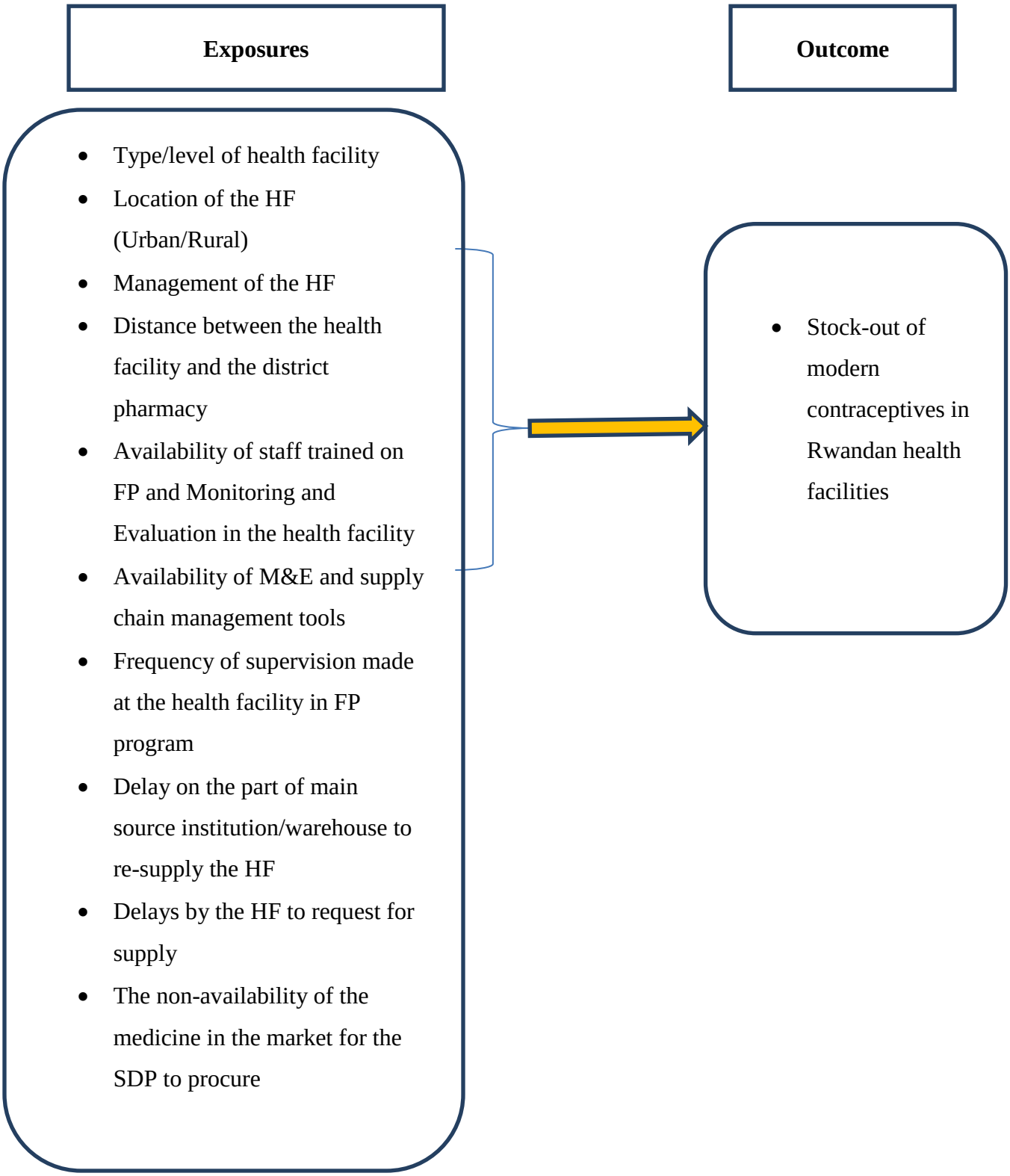
In Rwanda, the associated factors with stock out of FP program are not documented. This study will provide insight on those factors.

1.4. Conceptual framework

Different factors associated with stock-out were shown through a conceptual framework after a deep literature review, descriptive findings from 2014 SDP survey, as well as my personal experience. This includes the type/level of health facility; location of the HF (Urban/Rural); management of the HF; distance between the health facility and the district pharmacy; availability of staff trained on FP and Monitoring and Evaluation in health facility; availability of M&E and supply chain management tools; frequency of supervision made at the health facility in FP program; delay on the part of main source institution/warehouse to re-supply the HF; delays by the HF to request for supply and the non-availability of the FP commodity in the market for the SDP to procure should be proposed and analysed.

The conceptual framework described below is constituted by 2 parts: The first one is exposures made by proposed risk factors which were identified. The second part is constituted by one variable which is the main study outcome: Stock-out of modern contraceptives in Rwandan health facilities (Figure 1).

Figure 1. Conceptual framework of the study



1.5. Study objectives

1.5.1. General objective

To identify factors associated with stock-out of contraceptives in health facilities in Rwanda in 2014.

1.5.2. Specific objectives

- To identify factors associated with the stock out in contraceptives in health facilities on the day of the survey and in six months prior to the survey.

II. METHODS

2.1. Study design

This is a descriptive cross-sectional and analytical study which assessed factors associated with the stock-out of modern contraceptives in Rwandan health facilities for the period of December 2014. It is a secondary data analysis study.

2.2 Study site

This study concerned 174 health facilities, made up of 130 primary health facilities (health centres), 40 secondary health facilities (district hospitals) and 4 tertiary health facilities (referral hospitals) spread across the five provinces of Rwanda.

2.3. Study variables

Outcome variable

Stock-out of modern contraceptives in Rwandan health facilities: Health Facility at health center (primary level) not having at least three modern contraceptives and at least five modern contraceptives at the District Hospital and Reference Hospital.

Independent variables

Factors linked to the health facility:

- Level/Type of health facility: Primary (equivalent to Health center), secondary (equivalent to District Hospital) or tertiary (equivalent to Referral Hospital)
- Health facility location: Rural or Urban
- Distance between the health facility and the District pharmacy: HF located at 20km or less and HF located to more than 20 km to the district pharmacy
- Management of the HF: Referred to as Public or Faith-based/NGO facilities

Factors linked to the service providers:

- Availability of trained staff in health facility: Yes or No
- Frequency of supervision made at the health facility in FP program
- Availability of Monitoring and Evaluation and ICT tools: Yes or No

Factors linked to the supply chain management:

- Delays on the part of the main source institution/warehouse to re-supply the SDP with this medicine: Yes or No
- Delays by the SDP to request for supply of the medicine: Yes or No
- The non-availability of the FP commodity in the market for the SDP to procure

2.4. Analysis plan

During the review of these secondary data, univariate analysis wasused for descriptive and data summary purposes: graphical and tabular techniques by use of frequencies and bar graphs. Regarding quantitative variables, central tendency calculation (mean, median and SD) were calculated.

Bivariate analysis was used to determine the relationship between nominal variables (contingency tables).

Multivariate analysis was used to specify factors statistically associated with stock-out of modern contraceptives.

2. 5 Study population

2.5.1. Sample size calculation

This study concerned all 174 health facilities surveyed in October- December 2014 for facility and community assessment for reproductive health and FP commodities and services in Rwanda.

The sampling methodological approach provided in the UNFPA GPRHCS guidelines was adapted to Rwanda health system and administrative structure. The sampling frame was made up of health centres, district hospitals and referral hospitals as the primary, secondary, tertiary care SDPs respectively as the main attributes. Therefore, the total sample should contain a minimal number of each type of facility to support good estimation of the parameters of the population.

It is in this respect that the following formula wasused:

$$n = \frac{Z^2 p(1-p)}{d^2}$$

Where:

n =minimal sample size for each domain

Z = Z score that corresponds to a confidence interval

p = the proportion of the attribute (type of SDP) expressed in decimal

d =per cent confidence level in decimal

The formula was used to obtain the minimal sample size for the proportions of each category of SDPs under the assumptions estimated proportion of 0.5 that maximizes the sample size for proportions and 95% level of confidence. After calculation of the total sample size, an approach that gives large (tertiary and secondary facilities) a higher probability of inclusion in the survey because of their small number and provides a guide for choosing a sample of the primary facilities.

2.5.2. Sampling techniques

The sampled SDPs were selected using systematic random sample. The complete list of SDPs per Province and per domain was obtained from the MoH. The GPRHC guideline (1) for systematic sampling states that: "For each domain (Health facility level) the facilities should be listed without any order or regard to any characteristics". The total sample size for each category of SDPs has to be distributed among districts according to the administrative unit's share of a particular category of SDP. This requires the calculation of the relative proportions for each domain. The samples for each category of SDP are distributed among the various administrative Provinces by applying the proportions to the minimal sample sizes for each type of SDP.The outcome of the procedure means that all district and referral hospitals should be included in the sample and surveyed.

Rwanda has a total of 534 health facilities, made up 5 tertiary, 43 secondary and 486 primary Service Delivery Points providing modern contraceptive methods and life-saving maternal health medicines. In the computation of the minimum sample size, the relative proportion for each level of SDPs is calculated by dividing the Total number of SPDs in the level by the total number of SDPs on the sample frame and using the result as the "p" in the formula above to obtain the minimum sample size for each level of SDP as presented in Table 1.

Table 1. Minimum sample sizes for Rwanda based on 95% confidence interval and the corrected and inflated sample sizes

Minimum sample size by Confidence Interval and Confidence Limit	Minimal Sample Size of Service Delivery Points			
	Tertiary level care SDPs/facilities/ hospitals (or equivalent)	Secondary level care SDPs/facilities/ hospitals (or equivalent)	Primary Level Care SDPs/facilities (or equivalent to country context)	Total
[95% confidence interval (Z = 1.96) and 5% confidence limit (d = 0.05)	14	112	124	250
Corrected Minimal Sample Size of Service Delivery Point	5	43	124	172
Inflated (by 10% for primary SDPs) sample size	5	43	136	184

Because the minimal sample size obtained is greater than the population size, the whole population of the Secondary and Tertiary categories was included in the sample. This abnormality usually occurs when the size of the population is too small for the assumptions of normal distribution of the population to prevail using a given confidence interval and confidence limit. The abnormal sample size is therefore corrected by replacing the oversized samples by the population sizes.

The final step was to choose the specific SDPs to be included in the study. The following steps were followed:

1. For each domain, the facilities should be listed without any order or regard to any characteristics
2. A Sampling Interval (i) should be determined for each domain. This is done by dividing the total number of facilities in the domain by the sample size for that domain:

$$\mathbf{i} = \frac{\mathbf{N}}{\mathbf{n}}$$

Where:

i=sampling interval for the domain

N=number of SDPs in the domain

N=sample size for that domain

3. Select a starting point K by randomly selecting a number between 1 and i (the sample interval). Note that K becomes the first SDP in the domain to be chosen.
4. Then select successive SDPs for inclusion in the sample by moving at the interval K+i; K+2i; K+3i; K+4i; K+5i; etc until you have chosen the required sample size from the domain.
5. Steps 1 to 4 should be repeated for each domain in the population until the final sample was attained.

To compensate for possible non-response or non-existence of SDPs that provide a particular service (contraceptive or maternal health) it is recommended to slightly inflate the sample size by a factor of 10 per cent.The final sample size that was applied for this survey is presented at the bottom of table 3.

The total sample size for each category of SDPs was then distributed among districts according to the administrative unit's share of a particular category of SDP as shown in Table 2.

Table 2. Distribution of minimal sample sizes for each category of SDPs in Rwanda

Administrative Sub-Region	Category of Service Delivery Point			
	Tertiary level care SDPs (Referral hospitals)	Secondary level care SDPs (District hospitals)	Primary Level Care SDPs (Health centres)	Total
Bugesera District	0	1	3	4
Gatsibo District	0	2	6	8
Kayonza District	0	2	6	8
Kirehe District	0	1	3	4
Ngoma District	0	1	3	4
Nyagatare District	0	1	3	4
Rwamagana District	0	1	3	4
Gasabo District	2	2	6	10
Kicukiro District	1	1	3	5
Nyarugenge District	1	1	3	5
Burera District	0	1	3	4
Gakenke District	0	2	6	8
Gicumbi District	0	1	3	4
Musanze District	0	1	3	4
Rulindo District	0	2	6	8
Gisagara District	0	2	6	8
Huye District	1	1	3	5
Kamonyi District	0	1	3	4
Muhanga District	0	1	3	4
Nyamagabe District	0	2	6	8
Nyanza District	0	1	3	4
Nyaruguru District	0	1	3	4
Ruhango District	0	2	6	8
Karongi District	0	3	9	12
Ngororero District	0	2	6	8
Nyabihu District	0	1	3	4

Administrative Sub-Region	Category of Service Delivery Point			
	Tertiary level care SDPs (Referral hospitals)	Secondary level care SDPs (District hospitals)	Primary Level Care SDPs (Health centres)	Total
Nyamasheke District	0	2	6	8
Rubavu District	0	1	3	4
Rusizi District	0	2	6	8
Rutsiro District	0	1	3	4
TOTAL	5	43	124	172

Inclusion criteria

Every health facility visited in October -December 2014 SDP survey which:

- is supposed to offer modern FP methods
- is at the primary (Health center), secondary (District Hospital) and tertiary level(Referral Hospitals)
- is not purely private

Exclusion criteria

- Every health facility which is not supposed to deliver modern contraceptives
- Purely private health facilities
- Health posts

2.5.3 Data collection

The major objective of the facility assessment was to collect data on availability and stock out of RH commodities at health facility level. There were two categories of information collected including:

a) Commodity availability and facility resources

This looked at availability of modern contraceptives, maternal medicines, stock out rates, supply chains, existence of cold chains, staff training in FP, ICT, staff supervision for RH, guidelines and job aids, waste disposal and charging of fees.

This was collected using a standardised Health facility survey questionnaire provided by GPRHCs. The tool was slightly customised to the national context of Rwanda.

b) Client perception and appraisal of FP services

The study also assessed the conditions of services at the facility. A clients' perception survey was conducted at each sampled health facility. This was intended to solicit client's opinion about the FP services they receive. A client interview guide was used to collect clients' perceptions.

Other tools include a reporting template/outline and sampling methodology guide.

Data verification was done every day in the field to ensure completeness and that errors are corrected while in the field. This was intended to allow for high quality datasets.

All variables of interest in this study were collected in this study (secondary) and its quality is assured.

Data collection from that 2014 SDP survey dataset established was done using paper based pre-established data collection tool.

2.6 Materials (Study tools and statistical tests to be used)

During 2014 SDP survey, data were collected using a standard tool developed by UNFPA Headquarters for use across all 46 countries whereby this assessment was being done, to allow comparability of findings in the Eastern and Southern Region. The tool was elaborated in English and it has been translated in Kinyarwanda to allow easy data collection process and adapted to the national context of Rwanda.

The tools included a reporting template/outline, generic questionnaire for health facilities; clients' exit interview and sampling methodology guide.

Statistical tests

Data collection was done by SPH trained enumerators under guidance of SPH research team (faculty) and validated before data entry in SPSS, by also trained data entry clerks. Data were also checked for quality, cleaned for any consistency by SPH research leader.

During the review of these secondary data, univariate analysis was done with descriptive statistics that was plotted for proportions of health facilities with modern contraceptives stock-out in regard to different characteristics and data summary purposes: graphical and tabular techniques by use of frequencies and bar graphs.

Bivariate analysis was used to show the distribution and relationship between the explanatory variables and stock out status (Yes/No). Multivariate analysis was used to determine factors statistically associated with stock-out of modern contraceptives. Results were considered significant at 95% CI, with p-value of 0.05.

2.7.Utilization of findings for policy implications

The results from this study will be communicated to MOH and partners to adjust programs and focus their interventions on the risk factors which will be strongly associated with stock-out of modern contraceptives in Rwandan health facilities. Health facilities concerned also will be informed for actions to increase the availability of modern contraceptives in the health facilities by addressing the significantly associated factors.

2.8. Ethical considerations

As this study was ethically fully reviewed and approved by the CMHS IRB, there is no need to be submitted for ethical clearance at the secondary analysis level. The IRB clearance obtained will be presented for evidence in the matter.

Before conducting the 2014 SDP survey, informed consent was given to the heads of HFs, highlighting all the three ethical principles (justice, respect for the person and beneficence).

Confidentiality and privacy of individual study participants was ensured by not revealing the respondents' personal information, protecting the data with password protected in computer and locked in the room whereby only persons directly involved in the study could access.

III. RESULTS

3.1. General information on Health Facilities

3.1.1. Characteristics of health facility

Descriptive data on variables linked to the Health Facilities, to the health service providers and to the supply chain management showed that out of the total of 174 health facilities which participated in the survey, 75.3%(131 facilities) were in the rural area, most Service Delivery Points, 74.7% were health centers, the Provinces with the highest number of SDPs in the survey were Western Province,24.7% and Southern Province,24.1%, and 72.4% were managed by Government as shown in Table 3.

Table 3: Characteristics of health facility

Characteristics	Frequency	Percentage
Level/Type of SDP		
Health Center	130	74.7
District Hospital	40	23
Referral Hospital	4	2.3
Total	174	100
Residence		
Urban	43	24.7
Rural	131	75.3
Total	174	100
Provinces		
Kigali City	18	10.3
Northern Province	31	17.8
Southern Province	42	24.1
Eastern Province	40	23
Western Province	43	24.7
Total	174	100
Management		
Government	126	72.4

Faith Based/NGO	48	27.6
Total	174	100
Distance to Warehouse (in Km)		
<20	92	52.9
>=20	75	43.1
Missing	7	4
Total	174	100

3.1.2.Elementslinked to health care providers, materials and tools

Almost all health facilities,96% have staff trained in FP; 80.5% of health facilities received one supervision visit or more in a quarter, the majority of health facilities, 74.5% and 84.5% have the monitoring tools and FP guidelines respectively. All health facilities have ICT materials and 91.4% of them use the logistic form to do requisition as detailed in Table 4.

Table 4: Elements linked to health care providers, materials and tools

Characteristics	Frequency	Percentage
Availability of staff trained on FP		
Yes	167	96
No	7	4
Total	174	100
Supervision frequencies		
Once or more in a quarter	140	80.5
Once in more than a quarter	23	13.2
Missing	11	6.3
Total	174	100
Availability of monitoring tools/job aids		
Yes	130	74.7
No	44	25.3
Total	174	100
Availability of FP guidelines		
Yes	147	84.5
No	27	15.5
Total	174	100
Availability of ICT materials		
Yes	174	100
No	0	0
Total	174	100
Use of logistic form in the facility		
Yes	159	91.4
No	8	4.6
Missing	7	4.0
Total	174	100

3.2. Stock out of FP commodities on the day of the survey

Stock out of FP commodities was observedin 27, 6% of health facilities (48) as per Table 5.

Table 5: Stock out of FP commodities on the day of the survey

Characteristics	Frequency	Percentage
Stock out of FP commodities		
Yes	48	27.6
No	119	68.4
Missing	7	4
Total	174	100

3.3. Stock out of FP commodities within the last 6 months preceding the survey

Stock out of FP commodities within the last six monthswas observed in 44.3% of health facilities (77) as shown in Table 6.

Table 6: Stock out of FP commodities within the last 6 months preceding the survey

Characteristics	Frequency	Percentage
Stock out of FP commodities		
Yes	77	44.3
No	90	51.7
Missing	7	4
Total	174	100

3.4. Reasons of stock out in different FP methods

Stock out was remarked for female condoms and injectables and reasons for stock out in different HF were most of the time the low or no client demand for the contraceptives, especially for female condoms, whereby 62.5% of health facilities (15), out of 24 werestocked out in that product due to this reason, as displayed in Table 7.

Table 7: Reasons of stock out in different FP methods

FPproducts and reasons for stock out	Frequency	Percentage
Female condoms		
Delays by main source warehouse to re-supply the SDP	3	12.5
Delays of SDP to request for supply	2	8.3
The contraceptive is not available in the market	3	12.5
Low or no client demand for the contraceptive	15	62.5
Any other reason	1	4.2
Total	24	100
Injectables		
Delays by main source warehouse to re-supply the SDP	1	33.3
The contraceptive is not available in the market	1	33.3
Any other reason	1	33.3
Total	3	100

3.5. Factors associated withFP commodities' stock-outon the day of surveyusing bivariate analysis

None of the assumed factors was associated with stock outon the day of the surveyin FP commodities (p-value > 0.005for all variables) as shown in Table 8.

Table 8: Risk factors associated to FP commodities' stock out on the day of survey

Variables	Total		Stock out on the day of the survey		No stock out on the day of the survey		Pearson Chi-Square	p-value
	N	%	N	%	N	%		
Level/Type of SDP								
Health Center	130	74.7	34	27.2	91	72.8		
District Hospital and Referral Hospitals	44	25.3	14	33.3	28	66.7	0.577	0.477
Residence								
Urban	43	24.7	12	30	36	70	0.41	
Rural	131	75.3	36	28.3	91	71.7		0.840
Management								
Government	126	72.4	34	27.2	91	72.8		0.477
Faith Based/NGO	48	27.6	14	33.3	28	62.7	0.577	
Distance between HF and district pharmacy (in Km)								
<20	92	52.9	24	26.1	68	73.9		
>=20	75	43.1	24	32	51	68	0.705	0.401
Availability of staff trained in FP services								
Yes	167	96	45	27.2	117	72.2		
No	7	4	3	60	2	40	2.459	0.117
Availability of FP check-list or job aid								
Yes	130	74.7	38	29.2	92	70.8		
No	44	25.3	10	27	27	73	0.063	0.794
Availability of FP guidelines at SDP								
Yes	147	84.5	40	27.4	106	72.6	1.026	0.311
No	27	15.5	8	38.1	13	61.9		
Frequency of visits from direct supervision								
Once or more in a quarter	140	85.9	39	27.9	101	72.1		0.86
Less thanoncein a quarter	23	14.1	6	26.1	17	73.9	0.031	0

Use of logistic form in the facility								
Yes	159	95.2	48	100	111	93.3		
No	8	4.8	0	0	8	6.7	3.389	0.066

3.6. Factors associated with FP commodities' stock out within the last six months prior to the survey using bivariate analysis

Level/Type of SDPand the availability of staff trained in FP were associated with stock out in FP commodities within the last six monthsprior to the survey (p-value < 0.005for 2variables) as detailed in Table 9.

Table 9: Factors associated with FP commodities' stock out within the last six months prior to the survey using bivariate analysis

Variables	**Total**		**Stock out within the last 6months**		**No stock out within the last 6 months**		**Pearson Chi-Square**	**p-value**
	N	**%**	**N**	**%**	**N**	**%**		
Level/type of SDP								
District Hospitals and Referral Hospitals	42	25.1	13	31	29	69	**5.187**	**0.023**
Health Center	125	74.9	64	51.2	61	48.8		
Residence								
Urban	40	24	14	35	36	65	2.612	
Rural	127	76	63	49.6	64	50.4		0.106
Management								
Government	125	74.9	58	68.4	67	53.6	0.017	0.896
Faith Based/NGO	42	25.1	19	45.2	23	54.8		
Distance between HF and district pharmacy (in Km)								
<20	92	55.1	41	44.6	51	55.4		
>=20	75	44.9	36	48	39	52	0.196	0.658
Availability of staff trained in FP services								
Yes	162	97	72	44.4	90	55.6	**6.025**	**0.014**

No	5	3	5	100	0	0		
Availability of FP check-list or job aid								
Yes	130	77.8	57	43.8	73	56.2		
No	37	22.2	20	54.1	17	45.9	1.208	0.272
Availability of FP guidelines at SDP								
Yes	146	87.4	66	45.2	80	54.8	0.380	0.537
No	21	12.6	11	52.4	10	47.6		
Frequency of visits from direct supervision								
Once or more in a quarter	140	85.9	67	47.9	73	52.1		
Less than once in a quarter	23	14.1	8	34.8	15	65.2	1.359	0.244
Use of logistic form in the facility								
Yes	159	95.2	75	47.2	84	52.8		
No	8	4.8	2	25	6	75	1.507	0.220

3.7. Factors associated with FP commodities' stock out within the last six months prior to the survey using multivariate analysis

Using multivariate analysis, the level/type of the facility (District and Referral Hospitals are protected from having stock out) was the onlyassociated factorwith stock out in FP commodities within the last six month preceding the survey (p-value=0.026; OR=0.421;95%CI=[0.196-0.901]) as displayed in Table 10.

Table 10: Factors associated with FP commodities' stock out within the 6 months using multivariate analysis

Variables	Total		Stock out within the last Six months		OR	95% CI	p-value
	N	%	N	%			
Level/type of the facility							
District Hospitals and Referral Hospitals	42	25.1	13	31	1		
Health Center	125	74.9	64	51.2	0.421	[0.196-0.901]	**0.026**
Availability of staff trained in FP services							
Yes	162	97	72	44.4	0		
No	5	3	5	100	1	-	0.999

IV. DISCUSSION

This study aimed to determine the associated factors with stock out of modern FP commodities in Rwandan health facilities.

Out of a total of 174 health facilities, stock out of FP commodities was observed in 27.6% of health facilitieson the day of the survey and in 44.3% of health facilities in the last six months prior to the survey.Stock out was much observed in District Hospitals and Referral Hospitals and less in Health centers on the day of the survey (33% and 27.2% respectively), while Health centers were the most affected by stock out and less in the DHs and RHs within the last six months prior to the survey (51, 2% and 31% in that order). The FP commodity which was most stocked out was female condom that was observed in 62.5% of healthfacilities of all health facilities which had stock out due to low and/or no client demand in this product.

Comparably to other African countries, the Rwandan prevalence of FP commodities stock out is low compared to the study done in Tanzania, wherebythe availability of modern contraceptives was generally low in surveyed health facilities. Overall,67% of surveyed facilities were stocked out in contraceptivesfrom July 2008 –June 2009,58% in July 2009 –June 2010 and 55% in July 2010-March 2011(19).In all three years, condom and hormonal contraceptives were the only items that were available in relatively large quantity, 40% against the rest, 8% $p<0.004$(19).In a study done in Mali, nearly half, 46% of the facilities had at least one method that was out-of-stock on the day of visit(23).

Our results are also comparable to the findings of the study done in 33 public-sector facilities in Pikine and Guediawaye districts of the Dakar region in Senegal whereby stock-out for injectables and implants was 43% and 83% of the year, respectively(22).

The difference from Rwandan findings may be due to the Rwandan organized health system, leadership and high level commitment to improved maternal health focusing on increasing access to family planning as committed by the President of Rwanda, HE Paul Kagame during London summit July 11th 2012(24).

In comparison to other developing countries, stock out of FP commodities was observed in a study conducted in Pakistan as a significant problem on the day of the researchers' 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

CopperTIUDs, and none had spermicides in stock. Only 75% of the FWCs visited had oral pills, condoms, IUDs, and injectables in stock(25).

The results on stock out in Rwanda are also low compared to the findings of the study conducted in Armenia whereby there was limited availability, 18% of the appropriate contraceptive method mix in all types of facilities participating in the study throughout the five health networks. Only six percent of ambulatories and health centers, 44% pharmacies and 80% of polyclinics had the appropriate method mix leaving 94%, 46%, and 20%, respectively, without any method of family planning available; and no method of family planning was available at rural health posts(26).

According to our study results,being a health Centeras the level/type of the health facility was the only statistically significant associated factorwith stock out in FP commodities within the last six months preceding the survey (p-value=0.026) in health facilities in Rwanda.The association of the level of the health facility with stock out can be explained by the fact that theHealth centermaynot focus on requesting some methods like female condoms because of the low demand by the clients or some long acting reversal contraceptives like IUDs or implantswhen they don’t have a trained staff to provide them especially in case of staff turnover.

LIMITATIONS OF THE STUDY

This study being secondary data analysis limited the exploration of the demand as well as the supply side as the available data were not collected to address the particular research question of the associated factors with stock out of FP modern contraceptives in health facilities; some important variables to explain stock security in FP commodities were not available, the qualitative aspect was missing and there were limited time and financial support to collect additional datafor further analysis after deep literature review.

VII. CONCLUSION AND RECOMMENDATIONS

Conclusion

This study aimed at determining associated factors with stock out of modern contraceptives in Rwandan health facilities. Stock out of FP commodities on the day of survey and within six months prior to the survey was respectively 27.6% and 44.3%, a relatively low prevalence compared to other countries in the region.

This study identified being a Health Center (level/type of the health facility) as the only statistically significant associated factor with stock out in FP commodities within the last six months preceding the survey in health facilities in Rwanda.

This study showed the general snapshot of FP commodities availability in Rwandan health facilities. The availability of trained health service providers was mainly documented as a key achievement at all levels of SDPs.

However, stock out was really a problem in Health Centers and this would impact the FP services utilization especially because that is the level where a big number of clients get the FP services.

Recommendations

- The MoHand partners should keep the momentum in terms of availing enough qualified health service providers at all levels of SDPs.
- Continuous refresher trainings are key for the quality FP services provision as protocols and guidelines evolve over time.
- Regular and continuous monitoring and supervision are still needed to ensure the compliance with policies and guidelines in place; thus right-based quality services to the clients.
- All possible strategies should be put in place to reduce the stock out prevalence in all health facilities
- The whole range of contraceptives should be available as recommended for all levels of SDPs, including Health Centers in order to meet the choice of all the clients when needed.
- For researchers, a prospective study, quantitative and qualitative for a long period on the same subject in order to find out the associated factors with FP commodities availability would be necessary.

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