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Knowledge Regarding Uterine Prolapse Among Reproductive Age Group Women of Birendranagar, Surkhet, Nepal

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Abstract:
Background: Uterine prolapse is one of the most common causes of reproductive morbidity which influence the women quality of life. In Nepal one million women in suffer from uterine prolapse and most of them belong to the reproductive age. Uterine prolapse occurs when pelvic floor muscles and ligaments stretch and weaken until they no longer provide enough support for the uterus. As a result, the uterus slips down into or protrudes out of the vagina. Objectives: The main objective of this study was to assess the knowledge on uterine, prolapse among reproductive age group women in the selected community of the Birendranagar-04, Surkhet. Methods: A descriptive cross-sectional research design was selected for the study and non- probability purposive sampling technique was used to select 60 women of reproductive age group visiting selected community. Semi Structured questionnaire was used to collect data. The collected data were analyzed by using descriptive and inferential statistic through SPSS version 20. Result: The result of the study shows knowledge level of the 50% of respondent was poor 33.3% has average level of knowledge and only 16.7% of the respondent have good knowledge. There was significant association of knowledge with education level of the respondent, family type and place of delivery whereas no significant association seen between other socio- demographic variables. Hence, education level of the respondent is contributing factors to the knowledge level regarding uterine prolapse in reproductive age women. Conclusion: The study concluded that majority of the respondents had poor knowledge regarding uterine prolapse.

Keywords: Uterine Prolapse, Reproductive age, Nepal, Knowledge

INTRODUCTION

Uterine prolapse is one of the most common causes of reproductive morbidity which influence the women quality of life. In Nepal 1 million women in suffer from uterine prolapse and most of them belong to the reproductive age (Elsayed et al., 2016). Uterine prolapse occurs when pelvic floor muscles and ligaments stretch and weaken until they no longer provide enough support for the uterus. As a result, the uterus slips down into or protrudes out of the vagina. Uterine prolapse most often affects people after menopause who've had one or more vaginal deliveries (Mayoclinic, 2022).

The main cause uterine prolapse in Nepalese women is mainly gender discrimination. Early marriage, multiple births, lack of skilled birth attendants during delivery, continuous work throughout their pregnancies and soon after giving birth. It affects many aspects of a woman's quality of life, which ranges from physical discomfort, psychological, social and sexual lifestyle restrictions its risk factors include More than one pregnancy, Increasing age, Previous pelvic surgery (Paudel & Khadgi, 2018).

Statement of the Problem

A study to assess knowledge regarding uterine prolapse in selected community of Birendranagar-04, Surkhet, Nepal

Significance of the Study

- Study was useful as reference material for medical students for knowledge regarding uterine prolapse.
- The finding of the study was used as baseline data for further research.
- The study findings were the base for the health workers in future planning and implementation to bring awareness regarding uterine prolapse.
- The study was useful in implication for appropriate allocation of program by college committee to improve the level of knowledge regarding uterine prolapse.

Objectives of the Study

- To assess the knowledge on uterine, prolapse among reproductive age group women (15-49) in the selected community of the Birendranagar-04, Surkhet.
- To identify the level of knowledge on uterine prolapse among reproductive age group women.
- To measure the association between knowledge on uterine prolapse with selected socio demographic variables.

Research Hypothesis

All hypothesis will be tested at 0.05 level of significance.

H1: There will be significant association between knowledge on uterine prolapse among reproductive age group women with their selected demographic variables.

REVIEW OF LITERATURE

The descriptive cross-sectional study was conducted on Knowledge regarding uterine prolapse among women in Nigeria in January 2020. The sample was 302 women. The data was collected using semi-structured questionnaire by using face to face interview technique. The result showed that, 94.7% had low knowledge of uterine prolapse and 19.7% had good knowledge of uterine prolapse. The study concluded that most of the women had low knowledge regarding uterine prolapse. (Anozie Okechukwu et al., 2020).

A descriptive cross-sectional study was conducted on Knowledge Regarding Uterine Prolapse among Women in Tertiary Care Teaching Hospital in, Chit wan, Nepal from July to September, 2016. The study sample was 130 women. The data was collected using semi- structured questionnaire by using face to face interview technique. The result shows that more than half of the women 69% had a poor level of knowledge and 42.30% had a good level of knowledge of uterine prolapse. The study concluded that the level of knowledge on UP among women of reproductive age group was poor (Marasine et al., 2020).

A descriptive cross-sectional study was conducted on knowledge and practices of women regarding risk factors of uterine prolapse in Egypt in April 2016. The total sample was 200 married women. The data collection method was semi- structured questionnaire by using face to face interview technique. The results shows that more than half of the studied women 56.5% didn't

hear about uterine prolapse. The study concluded that the level of knowledge on uterine among married women of reproductive age group was poor. (Elsayed et al., 2016).

A descriptive cross-sectional study was carried on *Knowledge on Uterine Prolapse among Reproductive Age Group Women in Nepal* in November 2019. The sample was 150 reproductive age group women. Semi structured questionnaire by using face to face interview technique was used to collect data. The result showed that 46% had adequate knowledge, while 54% of the respondents had inadequate knowledge about uterine prolapsed. The study concluded that more than half of the respondents had inadequate knowledge about uterine prolapse (Bhurtel et al., 2019).

A descriptive cross-sectional study was conducted on knowledge on risk factors of uterine prolapse among reproductive age women of in Lalitpur, Nepal in February, 2016. The total sample was 185 women. Semi-structured questionnaire by face-to-face interview technique was used to collect data. The result shows that 46.5% women have adequate knowledge and 53.5% women have inadequate knowledge regarding risk factors of uterine prolapse. The study concluded most of the respondents had inadequate knowledge about uterine prolapse (Singh, Lama, & Maharjan, 2016b).

A descriptive cross-sectional study was conducted to assess Prolapse *related knowledge and attitude among married women of reproductive age* in Daulichaur VDC of Ba- jhang district in March 2016 to April 2016. The sample was 313 Married women of Reproductive age 15-49. Data was collected through Semi –structured questionnaire by using face to face interview technique. The study shows that almost three fourth 70% of respondents had low level of knowledge. The study concluded that most of reproductive age of women had low level of knowledge on uterine prolapse. (Khanal, Ghimire, Shrestha, & Koirala, 2020).

The descriptive cross-sectional study was conducted on women's knowledge regarding uterine prolapse at in Egypt in December 2017. The sample size was 220 women. The data was collected using semi-structured questionnaire by using face to face interview technique. The study result shows that majority of the studied women (80%) women had inadequate knowledge regarding uterine prolapse. The study concluded that the women had low level of knowledge regarding uterine prolapse (Rashad et al., 2018).

The descriptive cross-sectional study was conducted to assess the *knowledge about Uterine Prolapse* KIST Medical College Teaching Hospital, Kathmandu Nepal in 2017. The sample size was 80 women of reproductive age group. A semi structured questionnaire by using face to face interview technique was used to collect data. The result shows that 77% women had heard of uterine prolapse and 23% had never heard of it and don't have knowledge about uterine prolapse. The study concluded that some of the women had low level of knowledge about uterine prolapse (Maharjan et al., 2019).

A descriptive cross-sectional study was conducted in a population of pregnant women to assess Knowledge on uterine prolapse in 2019. The sample size used on 104 women. The data were collected through semi-structured questionnaire by using face to face interview technique. The result shows that knowledge 35.3% women had low level of knowledge. The study concluded that the knowledge on uterine prolapse is poor uterine prolapse. (Liu, Tan, & Han, 2019). A descriptive cross-sectional study was conducted on knowledge and factors affecting women with uterine

prolapse in Kaski, Nepal in August, 2016. The sample size was used on 100 women. The data were collected through semi- structured questionnaire by using face to face interview technique. The result showed that out of 56% of the women had inadequate knowledge about uterine prolapse. The study concluded that the most of the women had low knowledge regarding uterine prolapse. (Silwal et al., 2016). A descriptive cross- sectional study to assess knowledge regarding uterine prolapse among the women in Udaipur, India in 2019. The sample size was 240 women. The data was collected by semi-structured questionnaire by using face to face interview technique. The result showed that majority 63.33% of women had poor knowledge, 36.67% of them had moderate knowledge on uterine prolapse. The study concluded that most of the women had the knowledge on uterine prolapse was poor (Rawat, 2019).

A descriptive cross-sectional study was conducted to assess knowledge and of uterine prolapse at, South Ethiopia in April, 2018. The total sample size was 408 women. The women were selected using systematic random sampling technique and interviewed using pretested structured questionnaires. The study revealed that 51.2% mothers had inadequate level of knowledge on uterine prolapse. The study concluded that most of the women had low knowledge regarding on uterine prolapse. (Yohannes, Hadra, Aychilu, & Tulu, 2018).

A descriptive cross-sectional study to assess the knowledge regarding Uterine Prolapse among Reproductive Age Women at Melnallathur in Thiruvallur in May 2019. The total sample was 60 women of reproductive age group. The data collection method was semi structured interview by using face to face interview technique. The study shows that out of 60 samples 6.6% had adequate knowledge and 73.3% had moderate knowledge and 20% had inadequate knowledge. The study concludes that the reproductive age women have poor knowledge regarding uterine prolapse (Selvaraj, 2019).

Several studies revealed that knowledge on uterine prolapse can lower the risk, but knowledge is poor among women of reproductive age group women in order to reduce its occurrence as well as its complication and increase in health seeking behavior. Uterine prolapse is major public health issue in Nepal, for the prevention raising awareness and behavior change at individual, family and community level is necessary. In Nepal women deprived from education, has to go through early marriage, early pregnancy and frequent child bearing along with heavy lifting. Hence uterine prolapse seems effect of lack of awareness on uterine prolapsed in women.

RESEARCH METHODOLOGY

Research Design

A descriptive cross sectional study design was used.

Setting of the Study

The study was conducted at Shital and Suryamukhi tole of ward 4 of Birendranagar municipality of Surkhet district. The survey was conducted at Shital and Suryamukhi tole of Birendranagar Municipality, ward no. 4 Surkhet, Karnali Province, Nepal November to December 2022. The site is located at 28036'29" N latitude and 81036'34" E longitude and at the altitude of 725 masl. The location lies in the inner terai having subtropical climatic condition.

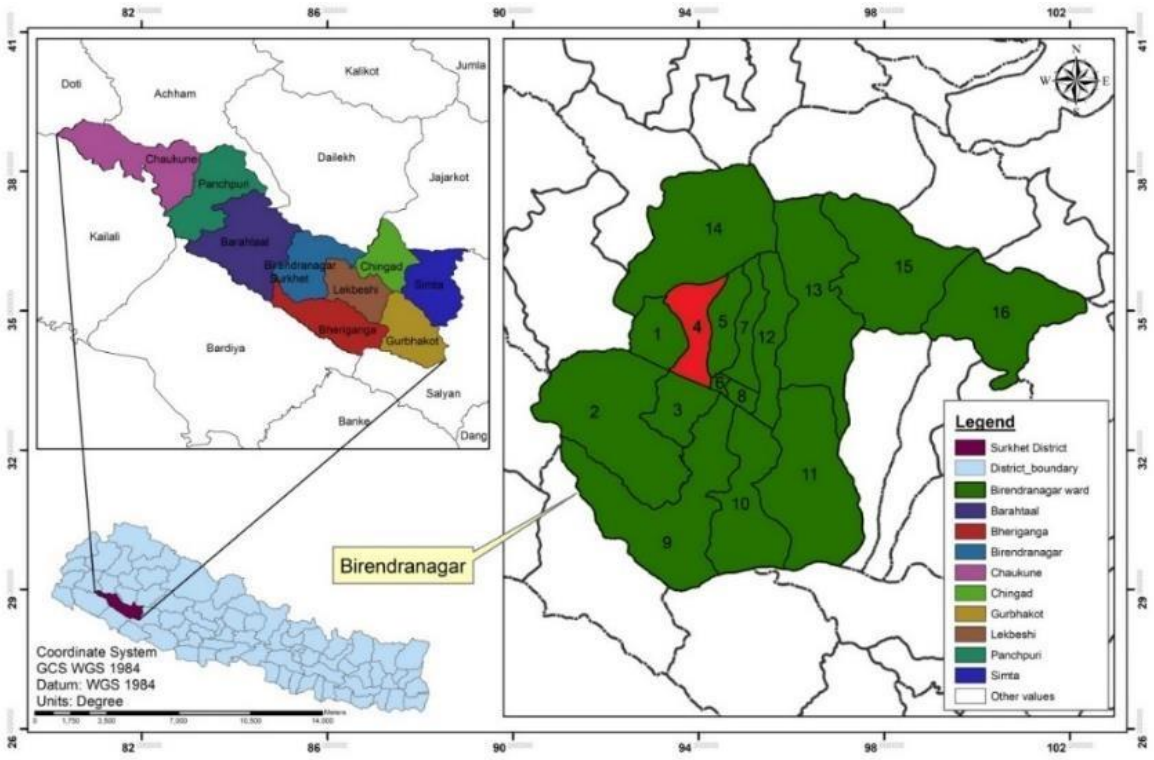

Figure 1: Map showing the setting of the study

Study Population

All reproductive age group (15-49 years) women of Shital and Suryamukhi tole of ward 4 of Birendranagar municipality of Surkhet district.

Sample Size

Sample size was 60.

Sampling Technique

Non probability convenience sampling technique was used to collect the data.

Sample Selection Criteria

Inclusion Criteria:

Women of reproductive age group in selected community of Birendranagar-04**,** Surkhet.

Tools of Data Collection

Semi-structured questionnaire was used by consulting the experts and supervisor. Questionnaire consist of two parts:

- Part I: Performa to collect socio-demographic data.
- Part II: Semi structured knowledge questionnaire on Uterine Prolapse

Data Collection Technique

Semi structured questionnaire with face-to-face interview technique was used to collect the data.

Pre-Testing of Tool

Pre-testing the instrument among 10% (6) of total sample size at selected community of Nepalgunj and necessary modification of the instrument was carried out as necessary.

Validity and Reliability

Content validity was established by extensive literature review, consulting with research advisors, statistician, subject matter experts and valuable suggestions from peers.

Data Collection Procedure

- Study was conducted after the approval of research committee of Bheri Nursing College.
- Written permission was taken from Bheri Nursing College.
- Request letter from the Bheri Nursing College was submitted municipal ward 4 office of Birendranagar municipality to collect the data in the selected community.
- After the permission, data was taken from setting.
- Informed written consent was obtained from all the respondents.
- The data was collected by using questionnaire technique.

Ethical Consideration

- The study was conducted after approval of proposal from Bheri Nursing College, Nepalgunj, Banke.
- Formal permission was taken from selected ward office of Birendranagar municipality of Surkhet district.
- Informed consent from responded was taken before starting questionnaire.
- Confidentiality and privacy were maintained.
- Respondents was not be influenced by any means to participate in the study.
- The data was personalized and used for the purpose of study.

Data Analysis and Interpretation

This research deals with the analysis and interpretation of data which were collected among 60 reproductive age women of the selected community of Birendranagar Municipality of Surkhet district. This study was conducted to find out the knowledge regarding uterine prolapse among reproductive age women. All the collected data were cleaned, entered and analyzed using statistical software. The analysis was done using descriptive statistics. All the information was reported in term of frequency and percentage with the help of tables.

All the obtained data were analyzed on the basis of the objective of the study.

- To identify the level of knowledge on uterine prolapse among reproductive age group women.
- To measure the association between knowledge on uterine prolapse with selected socio demographic variables.

The data were organized and presented under the following sections:

- **Section I:** Description of socio demographic characteristics.
- **Section II:** Distributions of knowledge regarding uterine prolapse among reproductive age women.
- **Section III:** Association between socio-demographic variables and knowledge regarding uterine prolapse among reproductive age women.

Section I: Description of socio demographic characteristics

This section of finding includes variables related to age, educational status, Ethnicity, Monthly income, residency, number of parities etc.

Table 1: Frequency and percentage distribution of reproductive age group women in terms of Age group of the respondents

		N=60
Variables	**Frequency**	**Percentage**
Age of Respondent		
15-30 Years	4	6.7%
30-45 Years	36	60.0%
45-60 Years	15	25.0%
>60 years	5	8.3%

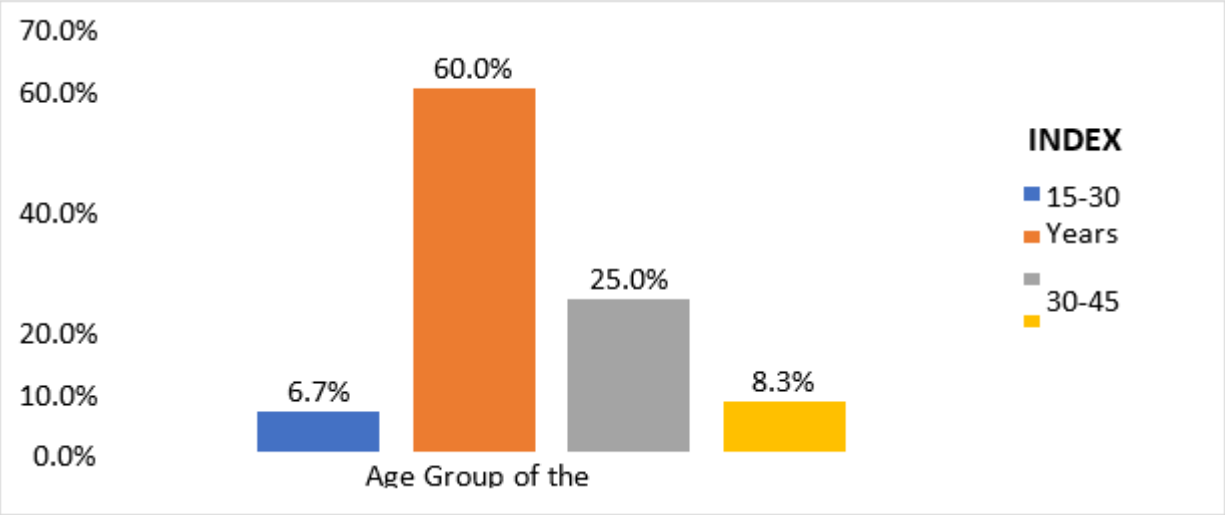

Figure 2: Bar diagram showing percentage distribution of reproductive age group women according to their age group

Interpretation

Table1 and figure 3 showed 60% of the respondents are of the age group 30-45 years, 25% of the respondents were of the age group 45-60 years, 8.3% were >60 years and least 6.7% are of 15-30 years

Table 2: Frequency and percentage distribution of reproductive age group women in terms of Ethnicity of the respondents.

		N=60
Variables	**Frequency**	**Percentage**
Ethnicity of Respondent		
Brahmin	27	45.0%
Chhetri	4	6.7%
Janajati	12	20.0%
Dalit	15	25.0%
Other	2	3.3%

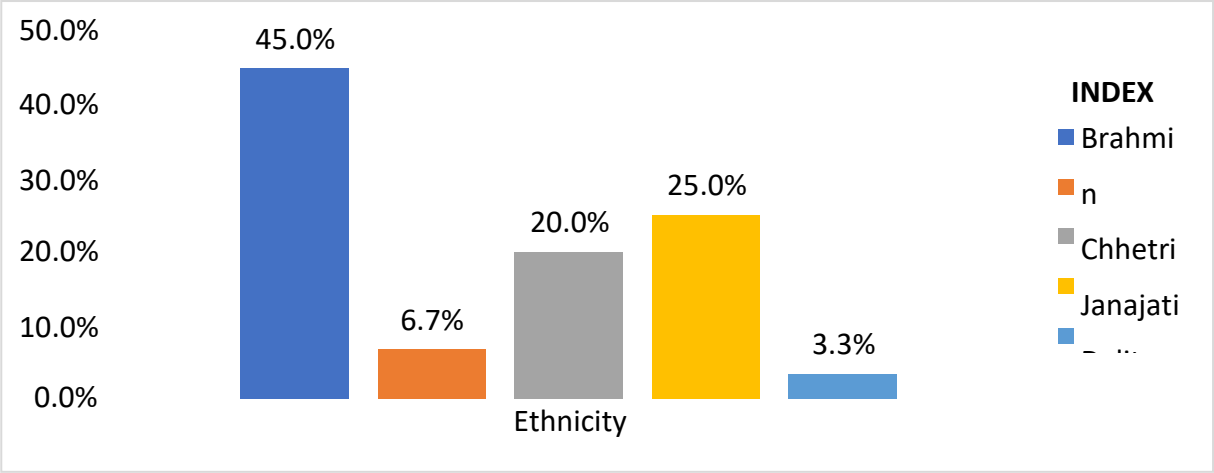

Figure 3: Bar diagram showing percentage distribution of reproductive age group women according to their Ethnic group

Interpretation

Table 2 and figure 3 represents the statistics of the ethnic group of the respondents that comprises 45% Brahmin, Dalit 25%, Janajati 20%, Chhetri 6.7% and other 3.3%.

Table 3: Frequency and percentage distribution of reproductive age group women in terms of Education level of the respondents

		N=60
Variables	**Frequency**	**Percentage**
Education level of Respondent		
Illiterate	20	33.3%
Primary Level (1-8)	5	8.3%
Secondary Level (9-12)	14	23.3%
Bachelor	21	35.0%

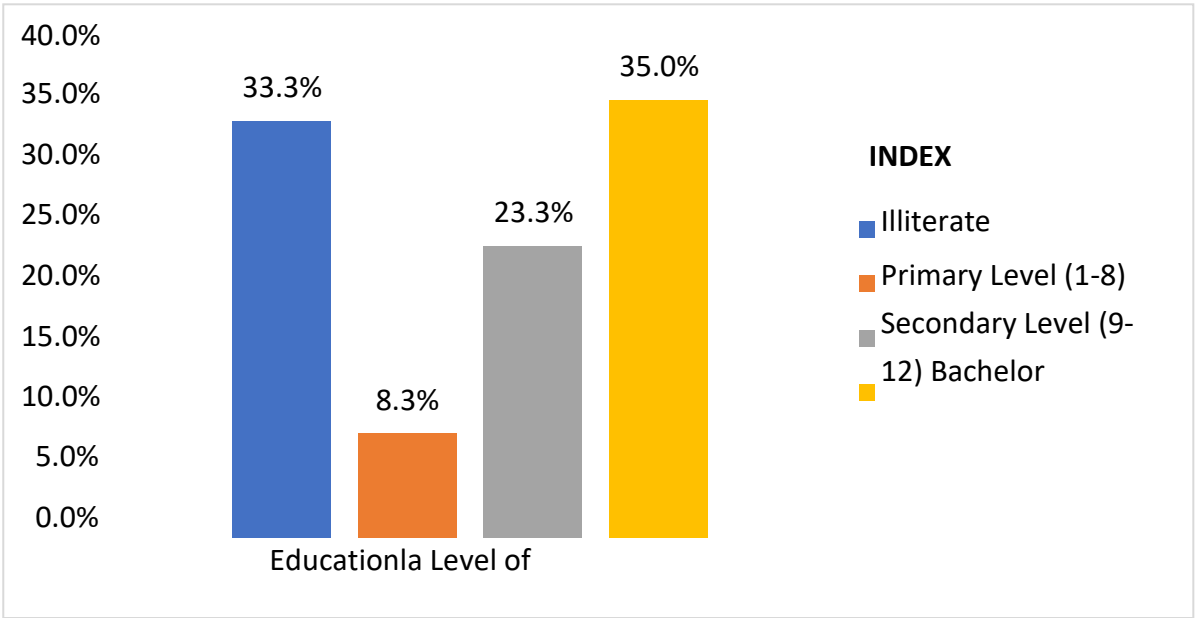

Figure 4: Bar diagram showing percentage distribution of reproductive age group women according to their education level

Interpretation

Table 2 and figure 5 represents the statistics of the ethnic group of the respondents that comprises 45% Brahmin, Dalit 25%, Janajati 20%, Chhetri 6.7% and other 3.3%.

Table 4: Frequency and percentage distribution of reproductive age group women in terms of occupation of the respondents

		N=60
Variables	**Frequency**	**Percentage**
Occupation		
House Made	34	56.7%
Labour	9	15.0%
Business	12	20.0%
Government Job	5	8.3%

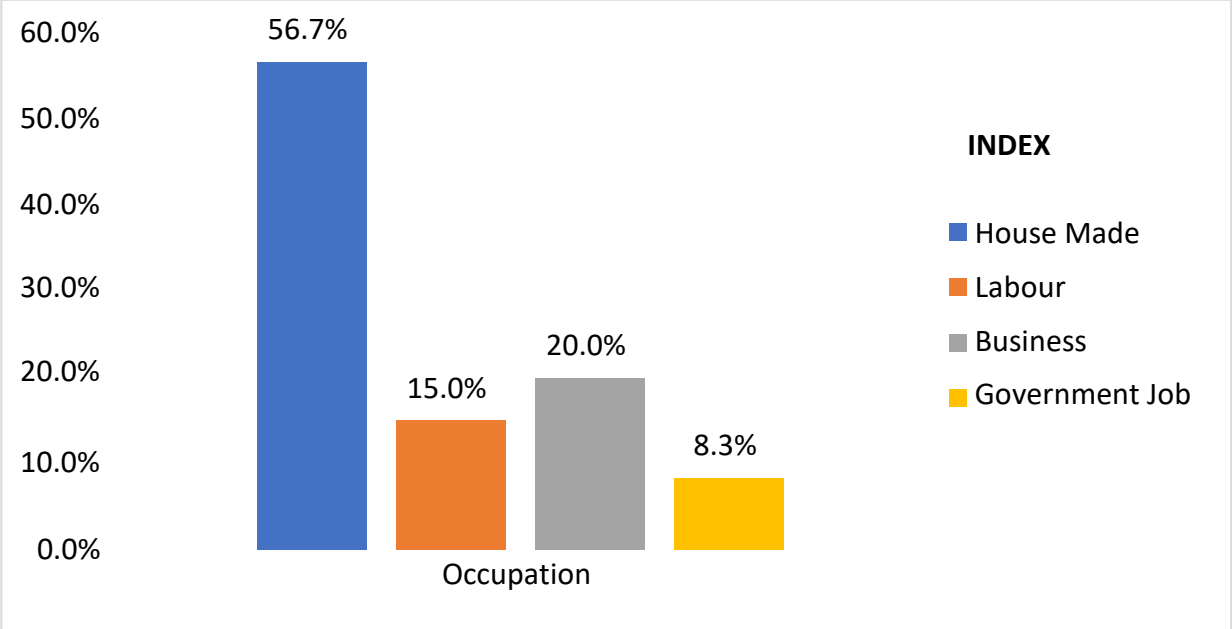

Figure 5: Bar diagram showing percentage distribution of reproductive age group women according to their education level.

Interpretation

Table 4 and figure 6 represents the statistics of the occupation of the respondents that comprises 56.7% house made, 20% own business, 15% work as labour and 8.3% have government jos.

Table 5: Frequency and percentage distribution of reproductive age group women in terms of family type of the respondents

		N=60
Variables	**Frequency**	**Percentage**
Family Type		
Nuclear	34	56.7%
Joint	19	31.7%
Extended	7	11.7%

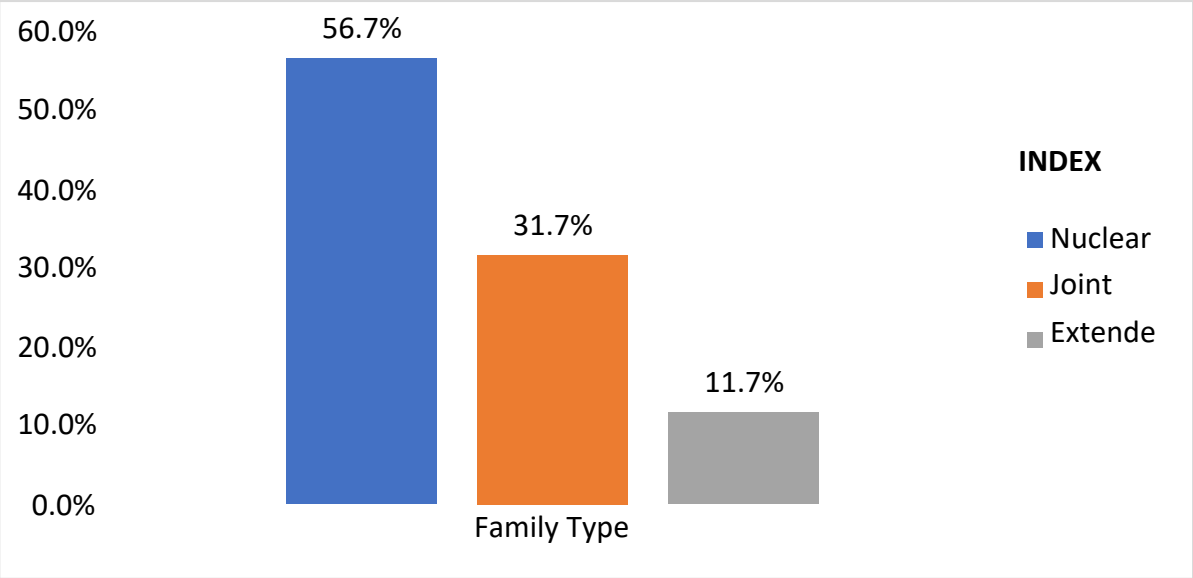

Figure 6: Bar diagram showing percentage distribution of reproductive age group women according to their family type

Interpretation

Table 5 and figure 7 represents the family type of the respondents that comprises 56.7% nuclear, 31.7% Joint and 11.7% Extended.

Table 6: Frequency and percentage distribution of reproductive age group women in terms of occupation of the respondents

		N=60
Variables	**Frequency**	**Percentage**
Resident Area		
Rural	2	3%
Urban	58	97%
Monthly Income of Family		
<10000	5	8.3%
10001-20000	14	23.3%
20001-30000	2	3.3%
>30000	39	65.0%

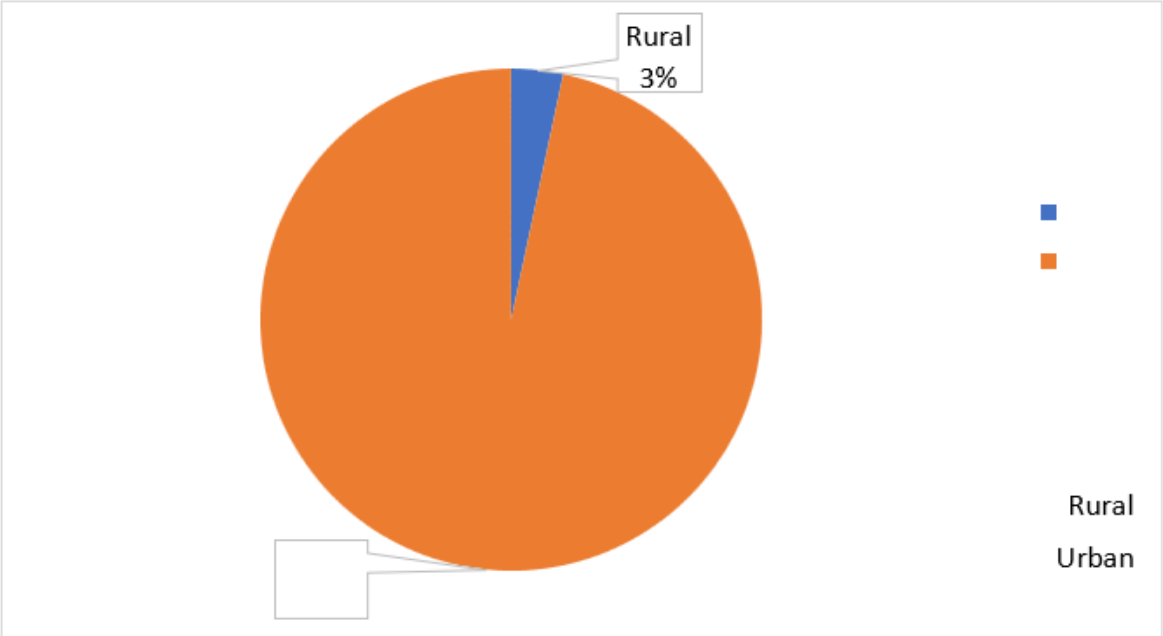

Figure 7: Pie chart showing percentage distribution of reproductive age group women according to their place of recidency.

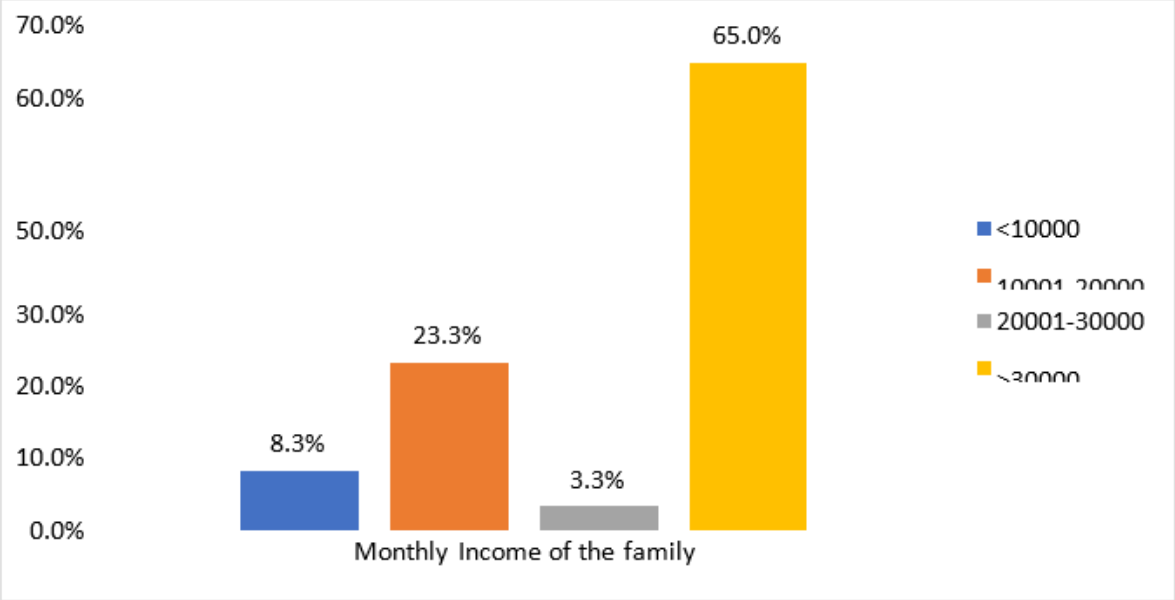

Figure 8: Bar diagram showing percentage distribution of reproductive age group women according to their monthly family income

Interpretation

Table 6, figure 7 and figure 8 Shows that 97% of the respondent are from urban residency and only 3 % are from rural setting. Also, 65% of the respondents have more than 30000 and only 8.3% have less than 10000 monthly incomes.

Table 7: Frequency and percentage distribution of respondent in terms of socio-demographic variables*:* Marital Status, No. of Parity and Place of delivery

		N=60
Variables	**Frequency**	**Percentage**
Marital Status		
Married	48	80.0
Single women	7	11.7
Divorced	5	8.3
No. of Parity		
None	5	8.3
One	23	38.3
Two	5	8.3
>=Three	27	45.0
Place of Delivery		
Home	23	38.3
Hospital	37	61.7

Interpretation

Table 7 Shows that 80% of the respondent are married with more than 3 numbers of children was 45% and 61% had delivered in hospital.

Section II: Distributions of Knowledge Regarding Uterine Prolapse Among Reproductive Age Women.

This section of finding includes variables related to knowledge about the Uterine Prolapse, meaning, causes, symptoms, preventive measures and treatments. Data was analyzed by using descriptive statistics.

Table 8: Frequency and percentage distribution of respondent in terms of Knowledge regarding Uterine Prolapse: Known to Uterine Prolapse, Source of Information.

		N=60
Variables	**Frequency**	**Percentage**
Known to Uterine Prolapse		
Yes	43	71.7
No	17	28.3
If Yes, Source of information		
Social Media	9	15.0
Relatives	31	51.7
Peer group	9	15.0
Female Community Health Volunteer (FCHV)	10	16.7
Mass Media (radio, television, newspaper,Pamphlets)	1	1.7

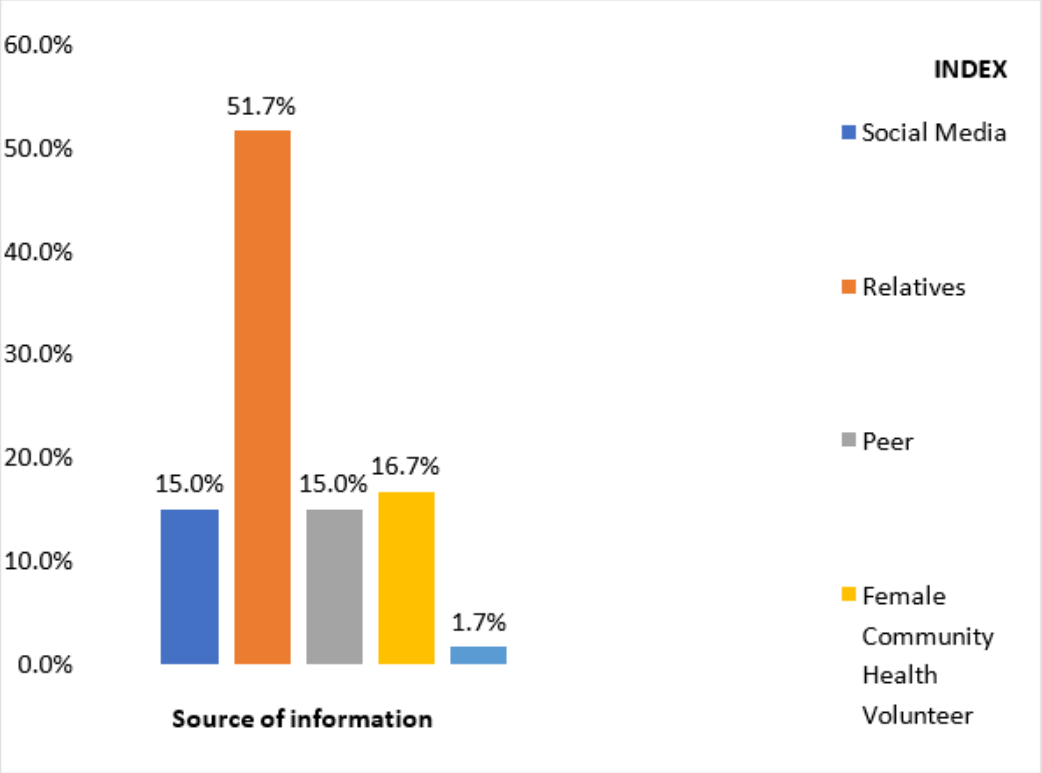

Figure 10: Bar diagram showing percentage distribution of reproductive age group women according to their education level.

Interpretation

Table 7 and figure 8 shows that 71.7% of the respondents were known to uterine prolapse from different source of information of which 51.7% from relatives followed by FCHV 16.7% and social media 15%.

Table 9: Frequency and percentage distribution of respondent in terms of Knowledge regarding Uterine Prolapse: Meaning, Causes and Symptoms

		N=60
Variables	**Frequency**	**Percentage**
Meaning of Uterine Prolapse		
Something falling out of vagina	36	60.0
Extra growth of tissue into Vagina	18	30.0
Swelling of vagina	6	10.0
Causes of Uterine Prolapse		
Carrying heavy loads during postnatal period	28	46.7
Multiple pregnancies	25	41.7
Delivered by untrained personnel	6	10.0
Lack of nutritional diets in postnatal period	1	1.7
Symptoms of Uterine Prolapse		
White vaginal discharge	21	35.0
Feeling of something coming out of vagina	32	53.3
Difficulty in walking	3	5.0
Involuntary pass of urine during coughing, sneezing and laughing	4	6.7

Interpretation

Table 9 shows that 60% of the respondents answered the meaning of uterine prolapse as something falling out of vagina and cause of uterine prolapse was carrying heavy load during post-natal period (46.7%) followed by multiple pregnancy (41.7%) and symptoms of uterine prolapse answered as feeling of something coming out of vagina (53.3%) followed by white vaginal discharge (35%).

Table 10: Frequency and percentage distribution of reproductive age group women in terms knowledge regarding degrees of Uterine Prolapse

		N=60
Variables	**Frequency**	**Percentage**
Degrees of Uterine Prolapse		
One	36	60.0
Two	21	35.0
Three	1	1.7
Four	2	3.3

Interpretation

The result shows that (Table 10) only 3.3% of the respondent correctly answered the no. of degrees of uterine prolapse.

Table 11: Frequency and percentage distribution of respondent in terms of Knowledge regarding Uterine Prolapse: Preventions, Treatment, No. of Surgeries and Main Surgeries

Variables	**Frequency (N=60)**	**Percent (%)**
Preventive measures of Uterine Prolapse		
Not lifting heavy load during postnatal period	32	53.3
Avoiding multiple pregnancies	11	18.3
Eating nutritional diets during pregnancy and post-natal Period	5	8.3
Preventing Perianal injuries	12	20.0
Treatments of Uterine Prolapse		
Medicines	21	35.0
Ayurvedic/herbal/allopathy/homeopathy	6	10.0
Ring pessaries/ surgery	31	51.7
No treatment	2	3.3
Number of Surgeries performed during Uterine Prolapse		
One	49	81.7
Two	2	3.3
Three	5	8.3
Four	4	6.7
Main surgeries performed in Uterine Prolapse		
Hysectomy	33	55.0
Prolapse repair	8	13.3
Both (a) and (b)	2	3.3
Laprotomy	17	28.3

Interpretation

Table 11 shows 53.3% of the respondents replied the preventive measure of the uterine prolapse is not lifting heavy loads during postnatal period and 51.7% answered treatment of uterine prolapse is ring pessaries/surgery followed by medicine 35% but only 3.3% of the respondents correctly answered number and type of surgeries performed during uterine prolapse.

Table 12: Frequency and percentage distribution of respondent in terms of Knowledge regarding Uterine Prolapse: Risk factor, Age group in risk and Risk/complication

		N=60
Variables	**Frequency**	**Percentage**
Risk factors of Uterine Prolapse		
Aging (>60 years)	14	23.3
Birth of large sized baby	24	40.0
Having one or more vaginal birth	20	33.3
Chronic coughing	2	3.3
Age group in risk of Uterine Prolapse		
15-30 years	15	25.0
30-45 years	17	28.3
45-60 years	12	20.0
>60 years	16	26.7
Risk or complications of Uterine Prolapse		
Infection	44	73.3
Piles	6	10.0
Cancer	7	11.7
Constipation	3	5.0

Interpretation

Result showed that birth of large sized baby is major risk factor of uterine prolapse (40%) and 26.7% answered the age group in the risk of uterine prolapse was above sixty years. 73.3% respondents replied infection is the major risk/complication during uterine prolapse (Table 12).

Table 13: Frequency and percentage distribution of respondent in terms of Knowledge regarding Uterine Prolapse: first step respondents act if faced with Uterine Prolapse and government intervention to improve the knowledge regarding Uterine Prolapse.

		N=60
Variables	**Frequency**	**Percentage**
Initial step after Uterine Prolapse		
Share with husband	31	51.7
Share with nearest friend	15	25.0
Reach out nearest health care facility	12	20.0
Visit doctor and follow his/her prescription	2	3.3
Government interventions to preventand improve the knowledge of Uterine Prolapse		
School education for sexual and reproductive health	11	18.3
Emphasize the prevention of Uterine prolapse in community health program	42	70.0
Strict rules and punishment against early marriage should be implemented	5	8.3

Awareness programs should be broadcasted from radio, tv, social medias	2	3.3

Interpretation

Result showed that 51.7% of the respondent replied that initially they share their problem with their husband if faced with the uterine prolapse and 70% of the respondents expected that government should emphasize the prevention of uterine prolapse in community health program to prevent and improve the knowledge of uterine prolapse among reproductive age women (Table 13).

Table 14: Knowledge level of the reproductive age group women regarding Uterine Prolapse

			N=60
Variables	**Frequency**	**Percentage**	**Mean± SD**
Knowledge level			4.5±1.83
Good	10	16.7	
Average	20	33.3	
Poor	30	50.0	

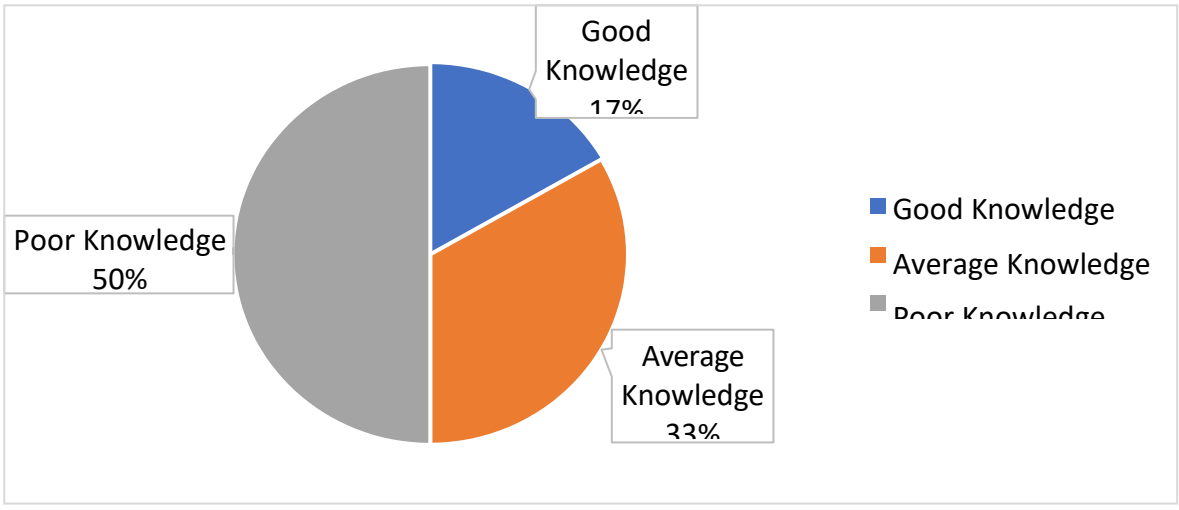

Figure 10: Pie chart showing knowledge level reproductive age group women regarding Uterine Prolapse

Interpretation

The figure 11 shows that knowledge level of the 50 % of respondent was found with poor knowledge regarding uterine prolapse followed by 33.3% with average level of knowledge and only 16.7% of the respondent have good knowledge. The mean knowledge score with standard deviation was 4.5±1.83.

Section III: Association Between Socio-Demographic Variables and Knowledge Regarding Uterine Prolapse Among Reproductive Age Women

Table 15: Association between socio-demographic variables and knowledge level of the respondents regarding Uterine prolapse

Variables	Good	Average	Poor	square	df	P value
	N (%)	N (%)	N (%)			
Age of Respondents				5.756[a]	6	0.451
15-30 Years	2 (3)	2 (3)	0 (0)			
30-45 Years	5 (8)	12 (20)	19 (32)			
45-60 Years	2 (3)	5 (8)	8 (13)			
>60 years	1 (2)	1 (2)	3 (5)			
Ethnicity of Respondent				10.563[a]	8	0.228
Brahmin	3 (5)	11 (18)	13 (22)			
Chhetri	1 (2)	2 (3)	1 (2)			
Janajati	2 (3)	6 (10)	4 (7)			
Dalit	4 (7)	1 (2)	10 (17)			
Other	0	0	2 (3)			
Education level of Respondent				36.779[a]	6	0.000**
Illiterate	0 (0)	5 (8)	15 (25)			
Pri(1-8)mary Level	1 (2)	0 (0)	4 (7)			
Secondary Level (9-12)	0 (0)	3 (5)	11 (18)			
Bachelor	9 (15)	12 (20)	0 (0)			
Occupation				7.291[a]	6	0.295
House Made	6 (10)	9 (15)	19 (32)			
Labour	0	4 (7)	5 (8)			
Business	4 (7)	4 (7)	4 (7)			
Government Job	0	3 (5)	2 (3)			
Family Type				16.571[a]	4	0.002*
Nuclear	10 (17)	13 (22)	11 (18)			
Joint	0 (0)	7 (12)	12 (20)			
Extended	0 (0)	0 (0)	7 (12)			
Resident Area				2.069[a]	2	0.355
Rural	1 (2)	0 (0)	1 (2)			
Urban	9 (15)	20 (33)	29 (48)			
Monthly Income of Family				7.386[a]	6	0.287
<10000	0 (0)	3 (5)	2 (3)			
10001-20000	1 (2)	3 (5)	10 (17)			
20001-30000	1 (2)	0 (0)	1 (2)			
>30000	8 (13)	14 (23)	17 (28)			
Marital Status				2.783[a]	4	0.595
Unmarried	9 (15)	17 (28)	22 (37)			
Single	1 (2)	1 (2)	5 (8)			
Divorced	0 (0)	2 (3)	3 (5)			
No. of Parity				7.659[a]	6	0.264
None	0 (0)	1 (2)	4 (7)			
One	6 (10)	10 (17)	7 (12)			
Two	0 (0)	2 (3)	3 (5)			

>=Three	4 (7)	7 (12)	16 (27)			
Place of Delivery				6.839[a]	2	0.033*
Home	1 (2)	6 (10)	16 (27)			
Hospital	9 (15)	14 (23)	14 (23)			

*P-value < 0.05 – statically significant (figure in the parenthesis represents percentage)

Interpretation

The data presented on table 15 shows the association between socio-demographic variables is tested through chi-square test. Since the *p-value* is less than 0.05 there is significant association of knowledge with education level, family type and place of delivery whereas no significant association seen between marital status, age, occupation, family monthly income and number of parities. Hence, education level, family type and place of delivery is contributing factors to the knowledge level regarding uterine prolapse in reproductive age women.

Hence, Hypothesis (Ho) is rejected, and H1 is accepted.

DISCUSSION

The present study was conducted among 60 respondents with objective of assessing the knowledge regarding uterine prolapse among the women of reproductive age group.

The findings of this study are discussed here by comparing with existing evidence of similar studies.

Section I: Socio-Demographic Variables of Reproductive Age Group Women

In this study among 60 respondents, majority of the respondents (60%) are of the age group 30-45 years. As contradict to cross section study conducted in 25 districts of Nepal by Shrestha, et al (2014) shows that 72.4% of the respondents fall under the age group 20-35 years. Ethnically 45% of the respondents are Brahmin followed by 25% Dalit, 20% Janajati 20%, 6.7% Chhetri 6.7% and 3.3% other. As compare to the study conducted by Shrestha, et al (2014) reveals that 43% of the respondents were Brahmin and 22.2% was Janajati.

Most of the respondent education level was bachelor's degree (35%) and 33.3% are illiterate followed secondary level (23.3%) and primary level (8.3%). As contradict to Shrestha, et al (2014), 34.9% respondents have secondary level education. 56.7% of the respondent are housewife and 20% run their own business. As compare to study conducted in Lalitpur by Singh, Lama, & Maharjan, (2016) shows that 49.7% respondents were housewives. Most of the respondents are from nuclear family type i.e., 56.7%. The similar finding was supported by a study conducted on Lalitpur by Singh, Lama, & Maharjan, (2016) which shows that 66.5% belongs to nuclear family.

Majority of the respondents i.e., 65% earns more than 30 thousand per month for their living. The similar finding was supported by a study conducted on Manmohan memorial hospital by Bhurtel, Mandal & Shah (2019) that majority of respondents (51.3%) had income above 30000. 80% of the respondent were married, supported by a study conducted on Manmohan memorial hospital by Bhurtel, Mandal and Shah (2021) that majority of respondents 90.6% were married.

Majority of respondents babies 61% born at hospital as contradict to cross sectional study conducted in Lalitpur by Singh, Lama, & Maharjan, (2016) shows that 3.8% respondents' babies were born at hospital. Majority (45%) of the respondents have three or more than 3 number of children supported by the cross-sectional study conducted by Baruwal, Somronthong & Pradhan

(2011) in Surkhet district that showed that majority of the respondents were found to have three children (28.1%).

Section II: Level of Knowledge Regarding Uterine Prolapse Among Reproductive Age Group Women

Present study shows that knowledge level of the majority of respondent was found poor (50%) followed by average level of knowledge (33.3%) and only 16.7% of the respondent have good knowledge. The mean knowledge score with standard deviation was 4.5±1.83. Similarly, the study conducted in Bhaktapur, Nepal by Shrestha, et al (2014) shows that 55% had comprehensive knowledge of uterine prolapse and uterine prolapse knowledge level was satisfactory in 37% of those who had ever heard about uterine prolapse. This may be due to community-based study, large sample size i.e., 4693, study population was only only married women of reproductive age, multi stage random sampling technique.

Present study shows that 71.7% of the respondents were known to uterine prolapse contradict to cross sectional study conducted in Nepal by Shrestha, et al (2014) reveal that 53% had never heard about uterine prolapse. This may be due to community-based study, large sample size i.e., 4693, study population was only married women of reproductive age, multi stage random sampling technique. Respondents came to know about the uterine prolapse from various source of information of which 51.7% from relatives followed by FCHV (16.7%) and social media (15%) as similar study conducted in 25 districts of Nepal by Shrestha, et al (2014) reveal that 47.2% had heard from friends and relatives.

Present study revealed that 60% of the respondents answered the meaning of uterine prolapse as something falling out of vagina and cause of uterine prolapse was carrying heavy load during post-natal period (46.7%) followed by multiple pregnancy (41.7%) and sign & symptoms of uterine prolapse answered as feeling of something coming out of vagina (53.3%) followed by white vaginal discharge (35%). As compare to cross sectional study conducted in Bhojpur by Shrestha, (2014) shows that 74.6 % replied offensive discharge from vagina as sign and symptoms of uterine prolapse. This may be due to community-based study, study population was only married women of reproductive age, cluster sampling with probability proportionate to sample size technique.

Result shows that most of the respondents (53.3%) replied the preventive measure of the uterine prolapse is not lifting heavy loads during postnatal period. As compared to cross- sectional study conducted in the Manmohan memorial hospital by Bhurtel, Mandal & Shah (2019) shows that majority of the respondents (80%) answered non lifting heavy loads during postnatal period as preventive measures of uterine prolapse. Majority of the respondents answered the treatment of uterine prolapse is ring pessaries/surgery (51.7%) followed by medicine (35%) but only 3.3% of the respondents correctly answered number and type of surgeries performed during uterine prolapse. As compare to study conducted in Bhaktapur, Nepal by Shrestha, et al (2014) shows 49.7% answered ring pessaries and 59.5% answered vaginal hysterectomy as the method of treatment of uterine prolapse. This may be due to community-based study, large sample size i.e., 3124, simple random sampling technique.

Result showed that birth of large sized baby is major risk factor of uterine prolapse (40%) and age group in the risk of uterine prolapse was above sixty years (26.7%). Majority of the respondents (73.3%) replied infection is the major risk/complication during uterine prolapse. As compared to cross sectional study conducted in Bhojpur by Shrestha, (2014) shows that 61% answered

infection as complication of uterine prolapse. This may be due to community- based study, different sampling technique i.e., cluster sampling technique.

Result showed that 51.7% of the respondent replied that initially they share their problem with their husband if faced with the uterine prolapse and 70% of the respondents expected that government should emphasize the prevention of uterine prolapse in community health program to prevent and improve the knowledge of uterine prolapse among reproductive age women.

Section III: The Association Between Knowledge Regarding Uterine Prolapse Among the Reproductive Age Group Women with Their Selected Socio-Demographic Variables

The data presented on table 15 shows the association between socio-demographic variables is tested through chi-square test. Since the *p-value* is less than 0.05 there is significant association of knowledge with education level, family type and place of delivery whereas no significant association seen between marital status, age, occupation, family monthly income and number of parities. Hence, education level, family type and place of delivery is contributing factors to the knowledge level regarding uterine prolapse in reproductive age women. As compared to cross-sectional study conducted in the Manmohan memorial hospital by Bhurtel, Mandal & Shah (2019) findings reveal that there was statistically significant association between educational status, family income whereas no significant association was seen between age, occupation, marital status, age of marriage, number of children and age at first childbirth.

CONCLUSION

The following conclusions were drawn based on the findings of the study.

- This study shows that the level of knowledge was poor in majority i.e., 50 %, average among 33.3 % and good in only 16.7 %, in the reproductive age group women regarding uterine prolapse in ward number 4 of Birendranagar Municipality, Surkhet.
- Chi-square test was used to test the association between knowledge score with their selected demographic variables (i.e., Age, Education level, ethnicity, no. of parity, Marital status, Occupation, Source of information). There is significant association of knowledge with education level, family type and place of delivery whereas no significant association seen between marital status, age, occupation, family monthly income and number of parities.
- The level of knowledge was found poor in most of them. It seems that most of them may be living unknowingly with uterine prolapse. Thus, the study concluded that knowledge gap should be addressed through different means of communications in the community and most priority should be given to reproductive age group women to achieve the highest degree of quality of life. The respondents expected that government should emphasize the prevention of uterine prolapse in community health program to prevent and improve the knowledge of uterine prolapse among reproductive age women.

LIMITATION

The limitation of study was:

- Study was conducted in only one ward of Birendranagar Municipality
- Non-probability purposive sampling technique was used, so the large representative was not involved so hard to generalized.
- Research study was conducted on only 60 sample.

So, the study finding could not be generalized.

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Community Participation in Water and Sanitation Service Delivery: An Empirical Case of Mantsopa Municipality, South Africa

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Abstract:
Water and sanitation access is recognized to be essential for the development of the South African economy. Despite decades of independence, the participation of citizens in water and sanitation service delivery is still constrained at the local level. This study utilized the qualitative methods approach, including interviews with community representatives and municipal officials, to assess the effects of community participation on water and sanitation services at the Mantsopa Municipality. Participants were chosen based on expertise and experience, while data was analyzed using a thematic approach. The study found that community involvement can lead to improved service delivery and increased resident satisfaction. However, the participants are generally dissatisfied with the quality of water and sanitation services due to delays and inefficient services arising from decades of use of facilities without maintenance. Existing barriers to decision-making include funding, lack of awareness and education about water and sanitation delivery, limited access to information and communication channels, cultural and social norms that discourage participation, and political and economic factors that hinder community involvement. Overcoming these barriers requires a multi-stakeholder approach that involves government agencies, civil society organizations, and local communities working together to promote public participation in water and sanitation delivery. Effective solutions should be tailored to the specific cultural, social, political, and economic factors at play in each context. The municipal authorities should consider redesigning the water supply and sanitation systems to accommodate the growing population while increasing the number of water tanks, and implementing more efficient municipal distribution systems.

Keywords: Community participation, Water and Sanitation, Service Delivery, Mantsopa Local Municipality, South Africa

INTRODUCTION

Since the transition into democracy in 1994, the South African government has formulated various legislations to improve service water and sanitation services, particularly among previously marginalized communities (Goldin & Kgomotso, 2005). In 2002, an apartheid-governance structure, composed of the state, provinces, and municipal governments, was established to ensure a comprehensive approach to a developing state (Nealer & Raga, 2007). As a semi-arid country, about 5 million South Africans, particularly rural residents, lack access to drinking water and improved sanitation (Hove et al., 2019; WHO & UNICEF, 2022). While policies and legislation exist to promote citizen participation in service delivery, such as the 1996 Constitution, Water Services Act of 1997 and the Municipal Systems Act of 2000 (Masiya et al.,

2019; South African Government, 1998), little is known about the extent to which citizens are actively engaged in decision-making processes around water and sanitation. This means that decision-making is dominated by a small group of people with political and economic power, rather than involving a wider range of stakeholders, such as community members, civil society organizations, and independent experts. This could lead to decisions being made to primarily benefit the interests of the elite, rather than the needs of the broader population (Mintrom, 2020). For example, municipalities may prioritize investing in infrastructure in affluent neighborhoods, rather than prioritizing areas with greater need. Studies suggest that although there has been some progress in providing water and sanitation infrastructure in South Africa, challenges remain in ensuring that these services reach all residents, particularly those living in informal settlements and rural areas (Monyepao & Uwizeyimana, 2018; Douglas & Fredendall, 2019). Furthermore, there is a lack of transparency in decision-making processes around the allocation of resources for water and sanitation, and citizens are often not adequately consulted or informed about service delivery plans. The practice of excluding diverse voices and perspectives can limit innovation and creativity in the sector (Denhardt & Denhardt, 2020). In addition, excluding community participation in decision-making can undermine trust and legitimacy in the water and sanitation sector. Communities may feel that their needs and concerns are not being considered, leading to frustration and potentially even resistance to government policies (Osborne & Plastrik, 2019).

These gaps are particularly prevalent in rural and marginalized communities where access to information, education, and resources is often limited. As a result, citizens may feel excluded from the planning, implementation, and monitoring of water and sanitation projects, leading to a mismatch between their needs and the priorities set by local government and service providers. Bridging these gaps requires a concerted effort to raise awareness, build capacity, and foster meaningful dialogue and collaboration between citizens, government, civil society, and private sector actors (Turnhout et al., 2010). Community participation is a practice that empowers citizens to have a say in municipal affairs through information sharing, consultation and mobilization aimed at informing and persuading a municipality and its policies (Shannon & O'leary, 2020). Including a broad range of stakeholders in decision-making can bring new ideas and approaches to the table, leading to more effective and sustainable solutions (Gargano, 2021). Given the enormous service delivery disparities that were brought with independence (Reddy, 2016), it is crucial that the South African government prioritize increasing community engagement and participation in the management of water and sanitation services, which up until now have been managed using "top-down" strategies (Smith et al., 2011) that have not been effective in meeting the needs of the most marginalized and vulnerable populations. This can be done by establishing community water and sanitation committees, soliciting public feedback on policy proposals, and creating opportunities for civil society and independent experts to participate in decision-making processes. Given the importance of citizen participation in ensuring equitable and sustainable delivery of water and sanitation services, further research is needed to understand the barriers to citizen engagement and to identify effective strategies for promoting meaningful participation. The experiences from Mantsopa Municipality offer an illustrative case for assessing barriers to community participation, how these affect water and sanitation service delivery, and strategies for sustainable redress among rural communities of South Africa.

EMPIRICAL AND THEORETICAL LITERATURE

In South Africa, social and ecological changes are taking place. The challenge of improving and transforming water service delivery towards a more socially and ecologically just position is well illustrated by the notion of a complex social-ecological system (C-SES), which is pertinent when seeking a fair transition. Water security problems related to water access and service delivery constraints are often intractable, multi-scaled and composed of different actors with different interests. Systemic approaches to addressing such complex challenges are on the rise globally and not only in South Africa. Despite this, government interventions have often taken top-down approaches and have rarely been effective in addressing rural challenges. The participation of the public in the administration of services means self-governance or participatory governance. In relation to this study, public participation is viewed as a continuous interaction between government and the public, ranging from informing and listening at one end, to implementing jointly agreed solutions at the other; and in between there is dialogue, debate, and analysis (Crescenzi & Rodriguez-Posee, 2011). Community participation in this regard is described as a community-based deliberative process by which interested or affected citizens, civil society organizations, and government actors are involved in policy-making before a decision is taken (Sigenu et al., 2019). The intention of community participation is primarily to influence decision-making processes that reflect 'the will of the people' (Mehta & Fugelsnes, 2003). Through community participation, the government can solicit the citizens' input, and effectively respond to their needs and common interests. South African local governments generally have legal frameworks which favour community participation in service delivery (Kaptein & Van Tulder, 2003). However, the consultative and participatory processes at the municipal levels continue to experience setbacks. To a considerable degree, there seem to be adverse factors that have the potential to paralyze efforts of rendering water and sanitation services. Furthermore, top-down and elitist approaches have proved less fruitful and there seems to be a need for more robust approaches to getting communities involved in issues related to service delivery at all levels of society (Smith et al., 2011). As stakeholders, community participation entails open, two-way communication or dialogue with diverse groups with the objective of understanding and solving issues of mutual concern (Government of South Africa, 1998; Smith et al., 2011). At the municipal level, it is important to consider community participation when planning and executing projects. This requires identifying potential stakeholders, understanding the social, economic, and political context, and developing strategies to engage and communicate with local communities. Without these elements, even the best approach may fail to achieve its desired impact (Fairbanks et al., 2007; Hove et al., 2019). Engaging communities requires participatory forums that are inclusive and interactive (Dawkins, 2021; Kaptein & van Tulder, 2003). Participants can build trust and ownership through active engagement, leading to more effective decision-making and implementation of solutions (Hove et al., 2019).

At the Mantsopa Municipality, it is important to be open to diverse community initiatives, even if they differ from official government views (Leduka, 2009). This can lead to more effective policies and programs that better serve the area, ultimately resulting in stronger and more resilient communities. This approach can help to foster a more inclusive society, where everyone's voices are heard and valued. It also demonstrates a commitment to respecting the autonomy and agency of local communities. Engagement can lead to more effective and inclusive decision-making by involving a diverse range of stakeholders (Hove et al., 2019). Dawkins (2020) suggests that effective stakeholder engagement should aim to create a level playing field for all parties involved, ensuring that each stakeholder has an equal opportunity to influence the outcome of the dispute. This can be achieved by promoting transparency, accountability, and inclusivity in

decision-making processes. Since water and sanitation projects are not islands but meant for humans, it is essential to engage all actors to deliver value to all involved parties. This involves understanding the needs and expectations of stakeholders, communicating effectively with them, and incorporating their feedback throughout the project lifecycle. By doing so, projects can be more successful in achieving their objectives and creating positive outcomes for everyone involved (Dawkins, 2021; Naidoo, 2005). When groups are involved in decision-making, it ensures that the needs and concerns of all stakeholders are considered, leading to more effective and sustainable water and sanitation services. This approach also promotes transparency and accountability in service delivery. (Fairbanks et al., 2007; Hove et al., 2019). This study draws on empirical evidence from the Mantsopa Municipality to investigate the effectiveness of residents' participation in water and sanitation service delivery in the area.

STUDY AREA AND METHODS

The study was conducted at the Mantsopa Local Municipality (Figure 1). The Municipality was selected because the South African constitution mandates local municipalities to ensure social services are extended to everyone without exception (Government of South Africa, 1996). However, the current conditions at Mantsopa reveal that the rural areas are poorly served in terms of water and sanitation. Farm workers and domestic water users walk long distances to water sources. Bulk water supply in the Municipality is, in most areas insufficient, and supply systems are not adequate. Meanwhile, facilities for water and sanitation services are rudimentary and standards are not guaranteed. Access to water and hygiene remains a dream to residents due to inefficiencies of the municipal water and sanitation systems (Leduka, 2009).

Figure 1: Location of Mantsopa local Municipality

Source: South African Government (1998)

Water-borne infections have become rampant, causing ill-health and death among the most vulnerable population such as women and children (Pretorius & Schurink, 2007). To permit an in-depth investigation into the prevailing conditions, the study adopted the qualitative approach. This enables us have direct personal contact with the participants and to examine their choices, behaviour and perceptions about water and sanitation service delivery in the municipality (Taherdoost, 2020). The study was less concerned with generalizability but rather focused on a

deeper understanding of the problem in its natural context (Dooly et al., 2017). The qualitative approach was used to obtain an insider perspective and be able to discover meaning embedded in the participants' daily experiences. This was helpful in condensing extensive and varied textual data into a brief/ summarized format. The sample was determined using the purposive technique. The purposive approach allows researchers to select participants based on their experiences, unique qualities or knowledge on the subject under study (Etikan et al., 2018). In applying this technique, we were able to identify and select different stakeholders who possessed requisite knowledge about the water and sanitation service delivery conditions in Mantsopa municipality. A total of 10 research participants were utilized in the study, including a municipal ward councillor, a town planner, an environmentalist, four household heads, a municipal engineer, a municipal development manager, and a representative from the local traditional council. These participants were chosen so that the study might benefit from their expertise, knowledge, and life experiences connected to the issue of investigation (Lakens, 2022; Lelissa, 2018). The participants' real names were substituted with pseudonyms to protect their privacy and anonymize their comments (Creswell, 2019). The inclusion criterion in the sample required the participants to have been a resident in the municipality and be actively involved in water and sanitation matters for at least the past five years. With the aid of a key informant, reconnaissance trip was initially made to the Municipality. This was followed by a pilot study with two participants from the Mantsopa community (Saunders et al., 2019). In the field exercise, semi-structured interviews were used to collect the data. The instrument collected data on the lived experiences, practices, opinions and expert knowledge of the participants on water and sanitation situation in the municipality. The interview procedure involved face-face interactions where questions were posed to elicit verbal responses from the participants (Fleming & Karsten, 2019). The data analysis followed a thematic approach. Typically, thematic analysis is used for a collection of texts, such as an interview or transcripts (Lakens, 2022). The researchers carefully reviewed the data to uncover common themes - subjects, concepts, and meaning patterns that repeatedly appeared from the views expressed by the participants.

RESULTS

Community Residents' Perceptions on Water and Sanitation Services

The findings showed that the participants were dissatisfied with the quality of services they received from the municipality. To express her satisfaction, Ms M. Tshabalala, said "I have never participated in decisions, but I have never experienced water scarcity. My family has never experienced any sewerage blockage and the quality of water is clean and suitable to be used for all purposes". This is perhaps, the participant resides in an urban area of Ladybrand, where the population is not congested and with a relatively better water and sewage system. Even though some individuals have been fortunate enough not to experience these water and sanitation-related constraints, we should be mindful of our privilege and work toward advocating for those who do not have access to these basic necessities. For instance, M. Legoa indicated that "we have obsolete infrastructure and that affects our water quality and sanitation systems. Sewage systems are chocked". This situation can pose threat to public health and the environment, as untreated sewage can contaminate water sources and cause the spread of diseases. Urgent action is needed to upgrade and modernize infrastructure to ensure water safety for people in the area. Similarly, M.Mabalani, indicated that "Our water infrastructure is too old. Due to poor service delivery by the municipal water supply system, I have to build a borehole facility to avoid disappointment, because the cut of water give rise to bad odour". The lack of municipal investment in upgrading the water infrastructure has resulted in an inadequate and unreliable water supply, which is a major concern for public health and safety. The government has to

prioritize the maintenance and improvement of the water infrastructure to ensure access to safe and clean water for all citizens. For M. Mcawada, "the municipality supply water through water tankers to the JoJo tanks. However, the water is unhealthy due to lack of hygiene practices, and inefficiencies of the municipal workers (tank fillers)". M. Mcwada further noted that the reason behind the erratic water supply is due to "the growth of our population and size of our geographical area is disproportionate to available water tanks". Thus, the municipality is unable to meet the high demand for water and better sanitation. The authorities should consider redesigning the water supply system to accommodate the growing population, increasing the number of water tanks, and implementing a more efficient distribution system. The use of Jojo tanks leads to affluent community members receiving quality water while depriving the poor. This was stressed by M. Ncheka who said: "the poor rely on unclean water. I am well aware of the ill infrastructure, failure of pump station and aging of pipes. The water we receive is sometimes brownish and has a funny taste and smell. I experience sewerage blockage but municipality in fixing them". The dissatisfaction of the participant lies on the poor state of water and sewage systems as a result of obsolete infrastructure. Access to clean water is a basic human right, and it is unacceptable that the poor have to rely on unclean water. It is crucial for governments and organizations to prioritize the improvement of water infrastructure in impoverished areas to ensure that everyone has access to safe drinking water. For M. Mabalane, there are instances when she experiences unavailability of water, and "sometimes water is brownish with alkaline and smell funny. She explained that during drought seasons, the community dam gets depleted, leading to water scarcity. This means that as a result of water scarcity, households could be negatively affected especially during latrine usage. Again, water scarcity can have serious consequences on the health and livelihoods of the local population, especially for those who rely on agriculture and livestock for their income. Therefore, it is important to implement sustainable water management practices and invest in alternative sources, like rain harvesting and storage of water, to mitigate the effects of drought. When asked about her evaluation of the quality of water from her household's main source, M. Mabalane said "I don't trust water from our main source, so I don't evaluate it. I only use it to bath and for washing, I buy water for cooking and drinking". Thus, for Mabalane, obsolete infrastructure, ineffective management, and use of surface water contribute to the dissatisfaction with the quality of water used and sanitation services received from the Municipality.

Barriers to Public Participation in Water and Sanitation Delivery

In the view of P. Majara, households are discouraged from participating in water and sanitation decisions due to a lack of information. The Municipality does not involve them in decisions. For instance, Majara said: "the municipality does not have proper communication and information channels to adequately inform us of imminent supply-cut and educate us about water and sanitation matters. The municipality does not procure quality chemicals for purifying or cleaning water. The water is dirty". This lack of information can lead to a situation where households are not fully aware of the potential benefits and risks associated with different water and sanitation options, and may therefore be hesitant to participate in decision-making processes. Providing residents with more information about these issues can help to increase their engagement and ensure that their voices are heard in the decision-making process. The municipality needs to ensure that the residents are kept abreast with the information while also empowering the local people and involving them at all levels of planning and decision-making regarding water and sanitation delivery. For S. Moeti, the local residents are not motivated to engage with the municipal officials because they receive "Very bad services. We cannot cook, do laundry and even struggle getting water to bath". Perhaps, a commitment to operation and maintenance and

ensuring that the local people participate in the delivery of safe and clean water will improve and protect the health of the communities. This will lead to an increase in the quality of life for residents and boost economic development for the region, creating a more vibrant and sustainable municipality. For instance, T. Nkhoke said there have been "many unfulfilled promises of infrastructural improvement due to lack of funds by the Municipality. I've never been satisfied with this water it's just that I don't have any other choice". This demonstrates that the participants are deeply concerned about the community's well-being, yet the municipality appears to be lacking financially to address those concerns. Since they do laundry, drink, and cook from the dam water source and their kids swim there, their health could be at risk. In addition, delays in responding to complaints of households and water users constitute a barrier to fruitful participation in service delivery. The lack of funds by the Municipality has also affected the quality of water supply, which is a basic necessity. It is unfortunate that residents have to settle for unsatisfactory services due to the unfulfilled promises of infrastructure improvement. For instance, Thebe said; "sometimes I experience sewerage blockage and complain about it, but the Municipal workers delay in responding to have it fixed. Water and sanitation service delivery was hindered by a lack of public awareness of meetings. Low attendance rates and inflexible meeting schedules". Thus, an effective municipal-stakeholder relationship could be important for enabling community participation in the delivery of social services. Similarly, T. Nkhoke expressed frustration over the lack of transparency and accountability by the municipality in the delivery of social services. Specifically, Nkhoke said "there are no transparent structures in terms of communication and getting feedback from the municipality". Such practice makes government agencies less accountable in the distribution of resources to citizens, and hence, could demotivate local participation. This lack of transparency can lead to frustration and mistrust among community members, as they may feel excluded from important decision-making processes and unable to voice their concerns effectively. To increase transparency, it is crucial for the municipality to prioritize open communication channels and actively seek feedback from their constituents in order to foster a sense of trust and collaboration within the community.

Measures to Sustainably Address Participatory Barriers in Service Delivery

In the view of T. Nkhoke, "frequent communication between the municipality and the people is needed". This could be possible where the Municipality establishes open forums for stakeholder engagement and interaction. M.E Ncwada adds that the municipality should ensure; "...cultural, social norms, political and economic factors hinder our involvement and participation decisions on water and sanitation. Women are sometimes excluded due to funding constraints and prevailing patriarchal social arrangements which gives males power over decision-making in our households...". These factors vary greatly across different regions and communities and addressing them requires a nuanced understanding of local contexts and power dynamics. Effective solutions to water and sanitation challenges must therefore be tailored to the specific cultural, social, political, and economic factors at play in each context. Similar to these sentiments, Majara suggests "private sector involvement is vital for addressing water and sanitation problems in our community". Since the municipality does not have adequate funds to maintain facilities, there will be the need to involve the private sector in areas of funding, metering, revenue collection and water distribution. Again, Leboea adds there is a "need to improve communication channels to accommodate various social groups. This will ensure improved sanitation service and sustain the quality of water in the community". The public requires education and awareness creation. Among the communication channels which could be used by the municipality include both print and electronic media such as radio, television, newspapers, and events like public durbars in the community. Through such engagement, the

municipality will have access to data and obtain public input on municipal initiatives pertaining to water and sanitation delivery. From service users, staff, senior managers, councillors, other council services, partner organizations and suppliers, it is important to participate in decisions on water and sanitation service provision. For Thabane, there is the need to "improve operational effectiveness and invest in water and sanitation infrastructure to lighten and shorten the provision of water and sanitation services". Again, Moeti considered the need to "enforce the FBW policy and the National Water Act (NWA) in the municipality to bridge access gaps to resources of the state". Though it's ideal to equally share resources and services among people, Nkhoke perceived that "there is the need for the Municipality to understand the social, economic, environmental and geographical factors which affect the quality-of-service provision". This is important because the municipality comprises people from different social and cultural groups. Any measure taken by government officials in terms of services to the people should be a holistic approach that adequately addresses the socio-economic constraints of society. For Moeti, "availability of funds from the national sphere of government to the provincial sphere is vital for improved service delivery to meet demands of the growing population". The municipality has a growing population, yet the decades of use of social amenities without repairs/ rehabilitation appear to be affecting its capacity to meet the current needs of the people. The central government should ensure the municipality have adequate funding for operational, administrative and service delivery. Water boards should be established in order to provide bulk portable and wastewater to water service institutions within their respective service areas. Water boards are established in terms of the Water Services Act of 1997 to provide bulk potable water to users within their respective service areas. In addition, strategic partnerships between local water service providers and water service authorities as well as the private sector, should be developed. There is a need for policies and programs that promote community engagement and empowerment in the planning, implementation, and monitoring of water and sanitation projects. This will ensure that the users and suppliers are aware of their respective duties/ expectations. The establishment of Water Services Authorities could facilitate lobbying of national government and development partners for strategic investment and partnership in the water and sanitation sectors of the municipality.

DISCUSSION

The findings highlight that despite decades of independence, water and sanitation access is still a minority privilege. It is important to recognize that access to clean water and sanitation is not universal and many people worldwide still face these challenges daily (WHO & UNICEF, 2022). Again, the water and sanitation facilities are in deplorable conditions. Similar to Goldin and Kgomotso, (2005), the situation is worst in the informal and marginalized settlements of Mantsopa, where inefficient services and decades of facility use without maintenance have continued to persist (Douglas & Fredendall, 2019). The lack of access to basic services in these areas not only affects the health and well-being of the residents (Pretorius & Schurink, 2007), but also perpetuates a cycle of poverty and inequality (Mehta, 2003; Reddy, 2016). Urgent actions are needed to address these issues and improve the living conditions of those living in marginalized settlements. Water scarcity in the Municipality is a humanly induced phenomenon (Hove et al., 2019) arising from overuse, mismanagement, and pollution of freshwater resources. It is a growing problem worldwide, affecting people and ecosystems (WHO & UNICEF, 2022). The residents in the municipality have to settle for substandard or poor water and sanitation facilities due to socio-economic, cultural, and physical barriers (Osborne & Plastrik, 2019) which tend to hinder active involvement and participation in policymaking and planning for service delivery (Shannon & O'leary, 2020). Funding constraints, lack of awareness, and limited access to

information and communication are key barriers to decision-making in the municipality. Meanwhile, elitist, and top-down decision approaches (Mintrom, 2020; Smith et al., 2011) appear to have failed to deliver optimal services in the area. It is important that duty-bearers recognize these context-dependent barriers in developing mitigation actions. Similar to Gargano (2021) and Hove et al. (2019), more collaborative, inclusive and multistakeholder approaches may be necessary to address the needs of the local population. This could involve working closely with the government, civil society, municipality, and vulnerable communities by involving them in decision-making processes. Without adequate infrastructure and capacities, access to clean water and basic sanitation becomes a challenge, particularly for marginalized communities (Monyepao & Uwizeyimana, 2018). Therefore, the government must allocate sufficient resources towards infrastructure development and build capacities of the municipality to mitigate challenges in the water and sanitation sector.

CONCLUSION AND RECOMMENDATIONS

Water and sanitation access is recognized to be essential for the development of the South African economy. Despite the taunted benefits associated with public participation in the water and sanitation sector, there are still challenges that hinder the effective implementation of such initiatives. The findings of this study highlight that the participants are generally dissatisfied with the quality of water and sanitation services due to delays, lack of communication, and inefficient services arising from decades of use of facilities without maintenance. The existing barriers to decision-making in the water and sanitation sector include funding constraints, lack of awareness and education about the importance of water and sanitation, limited access to information and communication channels, cultural and social norms that discourage participation, and political and economic factors that hinder community involvement. Initiatives that do not recognize the context dependency of these constraints are not likely to be effective because these barriers tend to perpetuate inefficiencies and reproduce humanly induced water scarcity and unsanitary conditions in the municipality. Overcoming these barriers requires a multi-stakeholder approach that involves government agencies, civil society organizations, and local communities working together to promote public participation in water and sanitation delivery. This will expand engagement beyond the government to include multi-actors like civil society and community actors who represent different interests in policy-making processes. In addition, providing the local people with more information about water and sanitation conditions can help to increase their engagement and ensure that their voices are heard in the decision-making process. The government must prioritize the maintenance and improvement of infrastructure to ensure access to clean water and basic sanitation for all citizens. Future research and initiatives of the municipal authorities should consider redesigning the water supply system to accommodate the growing population, increasing the number of water tanks, and implementing a more efficient distribution system to achieve a more inclusive and sustainable water and sanitation management in the municipality.

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Response to Gender Based Violence During Pandemics; A Lesson from Covid-19 Outbreak in Mbarara City South Constituency, Uganda

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Abstract:
At the height of the COVID-19 pandemic, gender-based violence (GBV) was reported to have increased worldwide. An escalation in intimate partner violence was experienced more during the Covid-19 than in other pandemics. This study was carried out in Mbarara City South Division to assess the response and adaptation strategies that were employed to manage gender-based violence during the Covid-19 outbreak in Uganda. Data was collected from technical personnel whose jurisdiction put them in position to interact with the victims of GBV during and after the covid-19 pandemic outbreak. Secondary data was collected from policy reports of the relevant line ministries and departments. The results show that the forms of GBV experienced during Covid-19 in Uganda included sexual, physical, emotional and psychological violence. The most vulnerable were women and girls though a few men also became victims. Causes of GBV during Covid-19 pandemic rotated around failure to provide for the family due to collapse of businesses and loss of jobs, nagging by spouses due to monotony and boredom, infidelity suspicions others. The measures adopted to respond to GBV during the covid-19 pandemic included involving family members to arbitrate, sleeping outside homes, use of phones to report and seek redress, fighting back, employing the withdrawal strategy, among others. The study concludes that Covid-19 pandemic exacerbated the challenge of GBV because measures imposed to manage the pandemic such as the lockdown made it difficult for the victims to seek redress for justice or run away from the perpetrators. The study recommends that policy measures be put in place to economically and socially prepare people with life skills to cope with the stressors and shocks that are associated with pandemic outbreaks.

Keywords: Response; Gender Based Violence; Pandemics; Covid-19

BACKGROUND/PROBLEM STATEMENT

Epidemics and other complex emergencies historically have had a disproportionate impact on women and girls, increasing their vulnerability to gender-based violence (GBV). The COVID-19 pandemic has been no different, with reports of rising cases of GBV emerging worldwide. The coronavirus disease 2019 (COVID-19) emerged from Wuhan, Hubei province in China at the end of 2019 only to become one of the fastest spreading viral epidemics that saw over 210 countries in total lockdown in a period of less than 90 days (Wu et al, 2020). On March 21, 2020, Uganda confirmed the first COVID-19 case and the number of cases kept on increasing, albeit gradually, (Atukunda, 2020; Ministry of Health Uganda, 2020). Due to this global pandemic, Uganda like other countries instituted various containment measures to curb the spread of the virus. Authorities in Uganda put in place a lockdown that involved the closure of public places and the country's borders, stay home except for emergencies among other measures (Ministry of Health Uganda, 2020).

In the past, crises have been linked with a surge in cases of gender violence (Campbell, 2020; Palermo, and Peterman. 2011; Enarson, and Fordman, 2001). An escalation in intimate partner violence was observed during other disasters such as the earthquake that hit Haiti in 2007, Hurricane Katrina in 2005, and eruption of Mount Saint Helens in the 1980s due to unemployment, family, and other stressors (Campbell, 2020). Even during the South Asian Tsunami of 2004, an increase in gender-based violence was observed. Fisher (2009) emphasized that in the aftermath of Tsunami, several incidents of violence against women and sexual assault were reported in Sri Lanka. Davis (2016) notes that outbreaks such as the Ebola, Cholera, Zika, and Nipah led to an increase in the cases of domestic violence in the areas where these outbreaks were experienced. According to Yasmin (2016), cases of rape, violence against women, and sexual assault increased during the Ebola outbreak in West Africa because of the inability for the victims to escape their abusers. Given this historic background, Covid-19 pandemic is not an exception to GBV increases.

Uganda has had more cases of gender-based violence (GBV) since lockdown than she has had for Corona virus (Sánchez et al. 2020). The prevalence of GBV in Uganda is above global and regional averages, and rates seem to have increased during the COVID-19 shock.

A 2020 national survey reports that almost all—95 per-cent—of Ugandan women between the ages of 15 and 49 have experienced physical or sexual violence at the hands of an intimate partner or non-partner during their lifetime. Nearly half (45 percent) of Ugandan women reported experiencing violence from an intimate partner during their lifetime; 35 percent reported having been victimized in the past year. These rates are well above the global averages of 27 percent during a life-time and 12 percent in the past 12 months as well as above those for Sub-Saharan Africa at 33 and 20 percent, respectively (UBOS 2021)

Long periods of lockdown limited women's ability to distance themselves from their abusive husbands as well as reduced their ability to access justice and external support after they had been physically, psychologically or sexually abused (Chen, et al, 2020). GBV is not only a Ugandan problem but also a regional and global problem. A week after most countries declared lockdown (last week of March), UN Women reported that in France domestic violence increased by 30% since the lockdown of March 17th; and in Argentina 25% since March 20th. In Cyprus, it increased by 30% and 33% in Singapore (UN Women, 2020).

Though the rate of covid-19 infection has drastically reduced in the country and most of the restrictions lifted, the impact of increased rates of GBV during the time of the outbreak raises concerns that this research intends to explore.

Study Aim

The study aimed at exploring the response strategies for preventing and reducing GBV during pandemics in Uganda drawing lessons from Covid-19 pandemic in Mbarara City South Constituency.

Research Question

How can Uganda learn from the experience of Covid-19 pandemic to improve preparedness and response to Gender Based Violence during pandemic outbreaks?

Significance of the Study

Given the fact that the outcome of gender-based violence is long lasting for its victims, and rampant for the responses that are often inadequate, it is crucial to seek for information that will lead to the development of more holistic response model to deal with the issue of gender-based violence in possible future pandemics.

This research is aligned with the Sustainable Development Goals (SDGs), aimed to create a better and fairer world by 2030. It specifically contributes to achieve the 5th, 10th and 16th goals that target gender equality, reduced inequalities and attainment of peace, justice and strong institutions respectively

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LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Liberal Feminist Theory

The study derives views from the Liberal Feminist Theory. Giddens (2001) defines liberal feminist theory as a feminist theory that believes gender inequality is produced by reduced access for women and girls to civil rights and allocation of social resources such as education and employment. The study borrows from liberal feminism theory because it goes along with the women empowerment approaches as they seek to reduce women's dependence on men. The feminist approach recommends developments to discard normalization of violence against women, hence it proposes legal reforms and introduction of social and economic empowerment programs to protect women against GBV in society.

The Concept of Gender Based Violence

Gender Based Violence (GBV) is a sign of gender inequalities and power imbalances between women and men in societies tailored towards access to and control of family and community resources (Clare, 2009). Gender – Based Violence, being a universal challenge knows no boundaries, race, culture and religion and Uganda is not spared, although there is variation across countries (Mullu & Gizachew, 2015).

The Convention on Elimination of all forms of Discrimination Against Women (CEDAW) GR 19, article 3 defines GBV as "violence that is directed against a woman because she is a woman." According to the 2014 Gender Equality Strategy of Uganda Pp 13, "*GBV refers* to *any act of violence that results in, or is likely to result in physical, sexual or psychological/ emotional harm or suffering to women and men, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in the public or private sphere"*. GBV occurs in many forms, which include intimate partner violence, rape and coerced sex, child sexual abuse, sex denial on either side of men or women, quarrelling, and human trafficking impact the way people make a living. GBV also includes various forms of abuse such as exploitation, incest, child abuse, attempted rape, female genital mutilation to mention but a few (Bloom, 2008; Schilderman, 2011; Fardon, 2011).

Covid-19 and Increased Rates of GBV in Uganda

With the presidential directive on closure of non-essential businesses and ban on public and private transport for almost three months has had and will continue to have a severe effect on jobs which are dominated by women. Although women would supplement the family income, these regularly work in the traditionally female-dominated informal economy such as market vendors, hair dressers, caterers and shop attendants (Omata & Kaplan, 2013). The closure of these businesses for almost three months without providing any social protection to mitigate the effects of loss of sources of livelihoods affected majority of the women and they faced difficulty

sustaining their families during this time and in future. In some cases, economic vulnerability increased the inability of women to temporary escape abusive partners.

With school closures and isolation in homes, women who already bore the brunt of unpaid domestic care work had to attend to it as a full-time job and for some in addition to their full-time jobs that they were doing from home. Many women had to tutor their children as governments around the world had temporarily closed schools in order to contain the spread of COVID-19. There are mounting concerns on the impact of these school closures on over 111 million girls who were living in countries affected by extreme poverty or conflict, where gender disparities in education are highest.

Most girls were forced into early and abusive marriages by parents who wanted to get quick economic returns from them. Others had teenage pregnancies that caused stigma and trauma among these young girls. When girls refused to be married off, they were harassed and chased away from their homes. There have been increased cases of street children in due course. In Mali, Niger, and South Sudan, three countries with some of the lowest enrolment and completion rates for girls, closures forced over four million girls out of school (Geiger, 2020).

Strategies for Reducing GBV in Uganda

Uganda has ratified a number of international and regional instruments which recognize the importance of addressing GBV in order to contribute to gender equality, equity and development in general, thus enactment of several gender responsive laws and policies, such as the Domestic Violence Act of 2010, women and girls in Uganda, continue to be victims of GBV with 99% especially within the household and extended family. The Convention on the Elimination of All Forms of Discrimination against Women (CEDAW,) recommendation number 19 (1992) noted that, GBV was a form of discrimination that seriously inhibited women's ability to enjoy rights and freedoms on a basis of equality with men. The Ugandan Constitution prohibits discrimination on the grounds of sex, gender and marital status.

METHODOLOGY

Study Site Selection and Location

Mbarara City has 23 wards divided into two constituencies (Mbarara City South and Mbarara City North). This study was conducted in Mbarara City South constituency which is composed of 10 wards ie kakoba, Nyamityobora, Katete, Ruti, Bugashe, Katojo, Kichwamba, Nyarubungo 11, Rukindo and Rwakishakizi. Four wards (2 rural and 2 peri-urban) were purposively sampled for inclusion in the study and this was mainly to ensure representativeness of the entire study area. The selected wards were (Ruti, Rukindo, Katete and Nyarubungo).

Mbarara City is estimated to be about 290 kilometers which are approximately 180 miles by road in the South West of Uganda's capital city, Kampala. Mbarara is an important transport hub due to mainly its strategic location. It links many districts in south western Uganda to the capital city of the country. Mbarara City has got the following coordinates that can help one access it from anywhere 003648S, 303930E. It can also be located via the following coordinates- latitudes and longitudes respectively; 0.6132 and 30.6582. According to UBOS (2020), the population of Mbarara City stands at 195,013.

Study Design

A case study research design was adopted due to the nature of the research questions that this study intended to address. As Yin (1984, p. 23) puts it, "the case study research design investigates a contemporary phenomenon when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used".

Yin argues that the case study approach provides for a careful selection of areas that are representative of and portray the different aspects being studied. This study aimed at assessing the response strategies employed for preventing and reducing GBV during pandemics in Uganda. A case of Covid-19 pandemic was taken for this assessment. Qualitative approach was adopted because it does not only help in the observation of behaviors but also brings out personal experiences, attitudes, perceptions and interpretations of events from the participants point of view (Bryman, 2004; Creswell, 2007; Flick, 2008).

The study utilized both primary and secondary data sources. Primary data was collected through in-depth interviews with key informants using the key informant interview guide. Where the meeting of some of the key informants proved difficult, phone interviews were conducted.

The study respondents included the Gender focal person at Mbarara district regional police offices, Mbarara City South Community Development Officer, Mbarara City Probation Officer, the Local Council 1and 2 Chairpersons for the four wards. The study being qualitative in design, respondents were purposively selected and the sample size determined accordingly. The selection of the key informants was on the basis that they are familiar with issues (Gender based violence) they meet in their daily interactions and administrative work with and in their communities. The table below presents the sample size and the sampling techniques employed per category of respondents

Respondent category	**Number**	**Sampling Strategy**
Mbarara City South Community Development Officer	01	Purposive
Mbarara City Probation Officer	01	Purposive
Local Council 2 Chairpersons (1 for each ward)	04	Purposive
Local Council 1 Chairpersons (3 for each ward)	12	Purposive
Gender Focal Police Officers at Mbarara District Regional Police offices	02	Purposive
Total number of respondents	**20**	

Secondary data was collected through document review from policy reports from the Ministry of Gender, Labour and Social Development, Mbarara City periodic reports from the probation office and the police gender desk that handles domestic violence. NGOs (The Uganda Human Rights Commission, Foundation for Human Rights Initiative, Action for Development (ACFODE), Gender Advisory Board Africa Region Secretariat, Hope After Rape (HAR) reports on GBV were also be reviewed.

Data Analysis

Data was coded thematically, where by data was categorized into major themes and sub-themes in order to have a logical flow of the research variables. Major themes were based on the general objective while sub-themes were advanced basing on the specific objectives following the

chronology of the research objectives. Since the research was qualitative in nature, the analysis of data was progressively done and coding was done after every data collection day.

Ethical Considerations

Informed consent was sought before conducting the telephone or physical interviews. The possibility of audio taping and photo taking was discussed before scheduling the interview. The ethical concerns of anonymity and confidentiality were strictly observed.

PRESENTATION OF RESULTS

Data from the interviewees and secondary sources is thematically summarized in the table below;

Theme	Responses
The most prevalent forms of GBV during the Covid-19 Pandemic in Uganda	• Physical • Sexual • Psychological • Economical
The most vulnerable sex	• Women • Men
Causes of GBV during the Covid-19 outbreak in Uganda	• Loss of jobs • Collapse of businesses • Suspicion of infidelity • Un met demands • Monotony and boredom • Culture and social barriers related to reporting cases of GBV • Fear and uncertainty
Response strategies employed to manage the gender-based violence	• Involvement of kin and kith • Withdraw strategy • Runaway strategy • Reporting to relevant authorities for redress • Fighting back
Increasing preparedness and response to GBV during and after pandemics	• Ensuring access to essential services • Strengthening prevention efforts • Promoting gender equality • Strengthening coordination and collaboration • Strengthening policies that fight GBV • Media information and awareness campaigns • Faith-Based programs and services

DISCUSSION OF THE RESULTS

Improving preparedness and response to GBV during pandemics requires an understanding of its causes and contributing factors, which often also serve as barriers to effective prevention and response because GBV is deeply rooted in discriminatory cultural beliefs and attitudes that perpetuate inequality and powerlessness, in particular of women and girls (Raftery et al.,2022). Various factors such as poverty, lack of education and livelihood opportunities, and impunity for crime and abuse, tend to contribute to and reinforce a culture of violence and discrimination based on gender (Sánchez et al. 2020).

Collapse of family, social and communal structures and disrupted roles within the family often expose women and girls to risk and limit coping mechanisms and avenues for protection and redress (Wanjiru, 2022).

Prevalent forms of GBV during the Covid-19 pandemic in Uganda

From the responses received, it was noted that the most prevalent form of GBV experienced during Covid-19 outbreak in Uganda was physical violence. Respondents revealed that significant proportions of the population experienced sexual violence, denial of resources/economic and psychological violence. Physical violence was through battering, kicking, scratching and biting which inflicted body harm and pain on the victims. This type of violence was not unique for Covid-19 pandemic but the fact that perpetrators and victims were locked up together for a considerable period of time, the problem was escalated. One of the key informants had this testimony;

Most women who were physically assaulted were neither able to run away from the perpetrators nor report them to authorities because of the lockdown. They had to persevere and live with the abusers (Key informant, Rukindo, 2022)

This finding is in agreement with other studies that revealed that coercive control and physical aggression are major forms of violence experienced during pandemics (Xue et al., 2020). Lindgärde & Houinato, 2020; Townsend, 2020 note that the introduction of social distancing and lockdown-type, stay-at-home measures resulted in conditions conducive to physical, emotional, and sexual abuse of the most vulnerable members of the society. Those who were abused by family members had little or no access to the usual routes of escape. As such, the world witnessed a surge in domestic violence cases since the onset of the COVID-19 pandemic.

From interview records, it was found out that during Uganda's COVID-19 lockdown, sexual violence reports increased, and increasing HIV exposure in national data. Sexual violence is any sexual act performed on an individual without their consent (Jansen, 2016). It can take the form of rape or sexual assault. Information that was received during one of the FGDs revealed that many women were sexually assaulted by their close relatives and neighbours. It was noted that many teenage pregnancies were reported during Covid-19 than other periods. The respondents further revealed that most of the teenage pregnancies were a result of rape or transactional sex for survival.

Whereas physical and sexual violence were experienced majorly by the females, most men suffered psychological violence during Covid-19 pandemic in Uganda. This was revealed mainly by the key informants in position of local leadership.

A key informant revealed that most men confided in him about the psychological harm that they suffered from their family members because of their inability to provide essential needs during Covid-19 period. Men reported that they were verbally insulted, harassed, defamed and labeled as incompetent and useless by their intimate partners and close relatives. This left them psychologically tortured and stressed.

Economic violence was another form of GBV that was mentioned during the interview held. It was revealed that economic violence involved acts and behaviors that caused economic harm to individuals. Many women who opened up to the leaders in their villages revealed that their mobile phones were damaged by their husbands because they wanted to cut off communication

between them (wives) and the outer world. Some were denied access to financial resources availed to the family as a response strategy during the pandemic (*the office of the Prime Minister gave out one hundred thousand Ugandan shillings (100,000/) to vulnerable individuals during the pandemic*). In case the women were the recipients of this money, most of the husbands would take it away for their personal use. The LC 1 for Nyarubungo Ward had this to share;

I received a case during the Covid-19 period in my office. The couple came and the main complaint was about 'Nabbanja money' as it was commonly nicknamed. (Honourable Robibina Nabanja is the current Prime Minister of Uganda and her office was responsible for giving out this money). The woman was complaining that the husband did not use the money for its intended use (to buy food items for the family). He instead bought food for his second wife yet the complainant was the one who was the registered beneficiary. When the complainant asked the husband, she was thoroughly beaten. (Key Informant, Nyarubungo, 2022)

The respondents attributed this to the financial strain that was being experienced during the pandemic since most people lost jobs and their livelihood sources were in balance. It was revealed that many women were denied from making economic decisions regarding utilization of resources in a home.

The Most Vulnerable Sex

Results point to the reality that women or girls are more vulnerable to experiencing GBV from their partners but also non-intimate partners during times of pandemics. Most responses given indicated that women and girls were more vulnerable than they're their male counterparts.

These results cannot be properly understood without making reference to the socio-cultural context. For example, my study setting where patriarchal systems exist, it is a common occurrence to find the women and girls abused by their partners and non-intimate partners and the abuse is considered to be normal.

Causes of GBV during the Covid-19 Outbreak in Uganda

This study highlights several factors that were responsible for the increased GBV during the Covid-19 pandemic in Uganda. Some of the reported causes as evidenced by the responses given included socio-economic status of the victims, loss of jobs and incomes by the perpetrators, increased demands with no solution, boredom and monotony, culture and social barriers related to reporting cases of GBV, increased pressure, fear and uncertainty, lockdown and limited access to justice.

Poverty, lack of livelihood opportunities, and inadequate access to income due to loss of jobs increased exposure to GBV during Cocid-19 pandemic and also forced women and young girls into forced prostitution, early marriages and survival sex (transactional sex). These results are similar to other studies that show that loss of a job (Mittal,2020), financial dependency (Rodriguez-Jimenez et al., 2020) and difficulty to adjust to lockdown circumstances increased vulnerability to GBV during COVID-19 (Jatmiko et al., 2020).

Response Strategies Employed to Manage the Gender-Based Violence During Covid-19 Pandemic

GBV is typically characterized by the use or threat of physical, psychological, sexual, economic, legal, political, social and other forms of control and/or abuse. GBV impacts individuals across the

life course and has direct and indirect costs to families, communities, economies, global public health, and development. During Covid-19 pandemic in Uganda, the victims adapted to a variety of measures to manage GBV and they included involvement of kin and kith to arbitrate, some had to report to local authorities, others had to fight back in self-defense while some had to find ways of running away from the perpetrators.

Increasing Preparedness and Response to GBV During and After Pandemics

Results from this study align with evidence from other studies which indicate that risk and vulnerability to GBV in Uganda increased since the onset of COVID-19. The findings provide an understanding of the interrelationship between GBV and COVID-19, which has formed a basis upon which the following measures to increase preparedness and response to GBV during and after pandemics are premised. The discussion below guided mainly by results from secondary data sources and supplemented by results from interviews.

By learning from the experiences of Covid-19, Uganda can improve its preparedness and response to GBV during and after pandemics by ensuring that victims and survivors of GBV have access to essential services and support. During pandemics, access to essential services such as healthcare and social services are often disrupted, exacerbating the risk of GBV.

Uganda can improve preparedness by ensuring that essential services for survivors of GBV are available and accessible during pandemics (Roy et al, 2022). This can include the provision of hotlines and online platforms for reporting GBV, the availability of medical and psychosocial support services, and the continued operation of safe shelters for survivors. Provision of adequate protection, care, treatment and support to victims/survivors, including access to legal counseling, rehabilitation and compensation for the harm suffered can go a long way in improving preparedness and response to GBV during and after pandemics (Sri et al., 2021).

Uganda can prioritize the prevention of GBV during pandemics through public awareness campaigns, community engagement, and the provision of information and resources. The media is a key conduit for making GBV visible, advertising solutions, informing policy-makers and educating the public about legal rights and how to recognize and address GBV. Newspapers, magazines, newsletters, radio, television, the music industry, film, theatre, advertising, the internet, posters, leaflets and community notice boards are all channels for providing information to victims and the general public about the dangers of GBV, GBV prevention and available services.

Gender inequality is a significant driver of GBV, and efforts to promote gender equality can reduce the incidence of GBV during pandemics. Uganda can take steps to promote gender equality, such as addressing gender-based discrimination in health care and education, promoting women's economic empowerment, and encouraging the participation of women in decision-making processes. The government can take measures to eliminate all beliefs and practices that discriminate against women or sanction violence and abuse, including any cultural, social, religious, economic and legal practices.

Uganda can improve its response to GBV during pandemics by strengthening coordination and collaboration between different stakeholders, including government agencies, NGOs, and communities. This can involve the development of a coordinated response plan, the establishment of a GBV task force, and the provision of resources for community-based

interventions. Support groups can be an important way for victims themselves to organize pro-actively and take charge of their own situation. Beyond emotional support, community groups can provide one another with a sense of security and even, if needed, a place to run to.

Response to GBV can be improved through criminalizing all acts of gender-based violence and ensuring that national law, policies and practices adequately respect and protect human rights without discrimination of any kind (Raftery et al.,2022). This can be achieved through investigating allegations of GBV thoroughly and effectively, prosecuting and punishing the perpetrators. In addition to criminalizing acts of GBV, there is also need for consistent application of the laws against GBV, and the implementation of penalties, and a greater focus on rehabilitating convicted perpetrators.

Religious counseling, support groups, education programs, groups and assistance programs can address GBV with their participants/worshippers. Most religions emphasize the importance of peace and tolerance. Framing a discussion of GBV in the context of religious tenets is one way to foster awareness and discussion of the problem (Sri et al.,2021). It may also be a way to identify and assist victims who do not feel comfortable talking to a health care provider or police officer.

According to Aaron & Beaulaurier(2017), batterer-intervention programs should be adopted in order to help with the perpetrators of violence since most of them may have other underlying problems that lead them into being violent. It was revealed that some of the perpetrators of violence were habitual wife batterers even before Covid-19 outbreak. One of the key informants mentioned that many perpetrators needed medical help to test whether they suffer from borderline mental disorders, bipolar or narcissistic personality disorder. Combating gender-based violence requires an understanding of its causes and contributing factors, which often also serve as barriers to effective prevention and response (Raftery et al.,2022).

CONCLUSION

Overall, the results demonstrate that vulnerability and experience of GBV increased during the COVID-19 pandemic in Uganda. Women and girls were prone to all types of violence especially physical violence, sexual violence, psychological violence, and denial of resources. Several factors are associated with vulnerability to GBV during COVID-19 including low socio-economic status, especially low education levels and the need for assistance for basic requirements such as medical support or health care. Based on these results, it can be concluded that the vulnerability and experience of GBV during COVID-19 should be understood in the socio-cultural context associated with acceptance of hegemonic masculinity and normalization of toxic masculinities that are intentional at subordinating women. These operate in the context where harmful social norms that tolerate and reinforce GBV practices are commonplace. This implies that interventions intending to prevent occurrence or reducing of vulnerability of women and girls to GBV in patriarchal settings should consider adopting social norms change strategies even long before pandemics occur.

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Loan Management and Performance of Deposit Money Banks in Nigeria: A Comparative Analysis

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Abstract:
This study investigated how loan management impact on performance of Deposit Money Banks in Nigeria covering the period 2000 - 2021 with special emphasis on First Bank, Access Bank, and United Bank for Africa. The model in the study used secondary data obtained from annual report and accounts of the selected banks for the period under study to determine the effect of loan management (through Loans and Advances and Non-performing loans of banks) on performance of the selected banks (through Return on Asset). The Data were analyzed using ratio analysis and Ordinary least square method. The specific finding of the work is that return on asset has inverse relationship with non-performing loans while they are positively related to loans and advances. The conclusion is that there is a significant relationship between bank performance and loan management. The study then suggests that deposit money banks should set up an efficient structure for loan management.

Keyword: Deposit Money Bank, Return on Asset, Loan and Advances and Non-performing Loans

INTRODUCTION

The banking industry has continued to play a crucial role in the economic development of economies such as Nigeria. This is because banks are able to simultaneously satisfy the needs and preferences of both surplus and deficit units (Owojori, 2011). They therefore contribute to the real productivity of the economy and to the overall standard of living. It is universally acknowledged that the banking industry plays a catalytic role in the process of economic growth and development (Uwuigbe, Uwuigbe and Daramola, 2014). This acknowledgement is reinforced by contemporary conceptualization to the effect that banks are veritable vehicles for mobilizing resources (funds) from surplus units and channeling them to deficit units.

Functions of Deposit Money Banks are to serve in creation of money, payment mechanism, pooling of savings, extension of credits, financing of foreign trade, trust service, safekeeping of valuables and brokerage services. The main function of banks is to receive deposits from individuals who have savings; these deposits are kept in various types of accounts opened in the bank. They lend from those deposits to those in need and charge interest. The Nigerian banking industry has been strained by the deteriorating quality of its credit assets as a result of the significant dip in equity market indices, global oil prices and sudden depreciation of the naira against global currencies (BGL Banking Report, 2010). These have worsened recently as Nigerian banks are contending with the effects of earnings from weak oil prices, shortages of US dollars, devaluation of the naira and slowing economic growth.

The drop in oil prices and the concomitant decline in the value of the naira against the dollar are severely testing the resilience of the recently reformed banking sector, according to a report entitled, "Cheap oil will test Nigerian banks resilience," by British researcher Oxford Analytica published on Nov. 25, 2015. After oil companies and the public sector, banks are the next most

vulnerable to falling oil prices. This is raising fresh concerns about the prospects of a repeat of the 2008-09 banking crisis. The low price of oil has led to a sharp increase in non-performing loans in Nigerian banks because many banks are heavily exposed to the oil sector.

Growth-wise, FBN Quest Limited, a research and investment banking arm of FBN Holdings Plc revealed that Nigerian banks are experiencing their slowest year since the last crisis (2009).

The industry ratio of non-performing loans net of provision to capital increased significantly to 30.9 per cent at end-June 2016 from 5.9 per cent at end-December 2015, depicting weak capacity of the sector to withstand the adverse impact of non-performing loans. "Non-performing loans in the period under review grew by 158 per cent from N649.63 billion at end-December 2015, to N1.679 trillion at end-June 2016", (CBN, 2016). It is however noted that only a few large banks showed resilience to the rising credit risk, even at the point of a very high per cent increase in the NPLs, while the others showed vulnerabilities. Amidst the economic situation facing financial institutions in Nigeria, it is important to know the current shape of loan management (credit risk management) in banks vis-à-vis the performance of Deposit Money bank. It is therefore imperative to lift the veils behind sustainable performance of banks even in a stressed financial system such as being experienced now in Nigeria. It is these problems that this research work aims at examining with a view to finding reasonable solutions.

CONCEPTUAL REVIEW

Loan Management and Credit Risk

Risk is defined as something happening that may have an impact on the achievement of objectives, and it includes risk as an opportunity as well as a threat (Audit Office, 2000). Credit risk is the risk that a loan which has been granted by a bank, will not be either partially repaid on time or fully (Campbell, 2007), and where there is a risk of customer or counterparty default (Gray, et al., 1997). There are many potential sources of risk, including liquidity risk, credit risk, interest rate risk, market risk, foreign exchange risk and political risks (Campbell, 2007). However, credit risk is the biggest risk faced by banks and financial intermediaries (Gray, Cassidy, and RBA., 1997). The indicators of credit risk include the level of bad loans (non-performing loans), problem loans or provision for loan losses (Jiménez and Saurina, 2006).

Credit risk arises whenever a lender is exposed to loss from a borrower, counterparty, or an obligor who fails to honour their debt obligation as they have contracted (Luy, 2010). According to Colquitt (2007), this loss may derive from deterioration in the counterparty's credit quality, which consequently leads to a loss to the value of the debt, or according to Crouhy, et al., (2006), the borrower defaults when he is unwilling to fulfill the obligations. Increasing shareholders' return with bank performance is one major objective of banks' management.

This is done by charging interest on loans to customers which are normally established taking into consideration the prevailing market rate and the established bank rate by the apex bank in the economy. The interest rate being charged on loans by the Deposit Money Banks is normally higher than the bank rate being approved by the apex bank, and building into it other charges as may be determined by the banks.

Bank performance is usually measured by profitability. Also, profitability is normally proxied by two alternative measures: the return on assets (ROA), which is the ratio of profits to assets and return on equity (ROE), which is profit to equity ratio. Generally, ROA shows the ability of banks

management to generate profits from the banks' assets, which may be biased due to off-balance-sheet transactions. On the other hand, ROE, which is often referred to as bank's equity multiplier, indicates the return to shareholders on their equity and it equals return on assets times the total assets-to-equity ratio. Banks with high equity and low leverage in the capital structure usually report high ROA, but low ROE. However, the analysis of return on equity (ROE) ignores the high risk associated with high leverage, and bank financial leverage is usually determined by monetary authorities. Hence, ROA emerges as the key ratio for analyzing bank profitability (IMF, 2002).

The return on assets (ROA) is a ratio that measures company earnings before interest & taxes (EBIT) against its total net assets. The ratio is considered an indicator of how efficient a company is using its assets to generate before contractual obligation must be paid. It is calculated as: ROA= EBIT/ Total Assets. Return on assets gives a sign of the capital strength of the banking industry, which will depend on the industry; banks that require large initial investment will generally have lower return on assets (Appa, 1996).

THEORETICAL REVIEW

Determining Performance and Financial Position of Banks

CAMELS Theory:

The 'CAMELS' approach was developed by bank regulators in the US as a means of measurement of the financial condition of a financial institution. Accordingly, the 'Uniform Financial Institutions Rating System' was established by the Federal Financial Institutions Examination Council in the US. Here, the acronym 'CAMELS' stands for, Capital Adequacy (C), Asset Quality (A), Management (M), Earnings (E), Liquidity (L) and Sensitivity to Market Risk (losses arising from changes in market prices) (S).

(i) **Capital Adequacy:** Capital adequacy is measured by the ratio of capital to risk-weighted assets (RWA). A sound capital base strengthens confidence of depositors

(ii) **Asset Quality:** One of the indicators for asset quality is the ratio of non-performing loans to total loans (GNPA). The gross non-performing loans to gross advances ratio is more indicative of the quality of credit decisions made by bankers. Higher GNPA is indicative of poor credit decision-making.

(iii) **Management:** The ratio of non-interest expenditures to total assets (MGNT) can be one of the measures to assess the working of the management. . This variable, which includes a variety of expenses, such as payroll, workers compensation and training investment, reflects the management policy stance.

(iv) **Earnings:** It can be measured as the return on asset ratio.

(v) **Liquidity:** Cash maintained by the banks and balances with central bank, to total asset ratio (LQD) is an indicator of bank's liquidity. In general, banks with a larger volume of liquid assets are perceived safe, since these assets would allow banks to meet unexpected withdrawals.

(vi) **Sensitivity to Market Risk** (losses arising from changes in market prices) (S).

Credit Risk Theory:

Credit risk, as defined by the Basel Committee on Banking Supervision (2001), is also the possibility of losing the outstanding loan partially or totally, due to credit events (default risk). It can also be defined as the potential that a contractual party will fail to meet its obligations in accordance with the agreed terms. Credit risk is also variously referred to as default risk, performance risk or counterparty risk (Brown and Moles, 2012). Credit risk is by far the most significant risk faced by banks and the success of their business depends on accurate

measurement and efficient management of this risk to a greater extent than any other risks (Gieseche, 2004). Credit risk is critical since the default of a small number of important customers can cause large losses, which can lead to insolvency (Bessis, 2002).

Although people have been facing credit risk ever since early ages, credit risk has not been widely studied until recent 30 years. Early literature (before 1974) on credit uses traditional actuarial methods of credit risk, whose major difficulty lies in their complete dependence on historical data. Up till now, there are three quantitative approaches of analyzing credit risk structural approach, reduced form appraisal and incomplete information approach (crosbie et al, 2003).

EMPIRICAL AND METHODOLOGICAL REVIEW

Kargi (2011) evaluated the impact of credit risk on the profitability of Nigerian banks. Financial ratios as measures of bank performance and credit risk were sourced from the annual reports and accounts of sampled banks from 2004-2008 and analyzed using descriptive, correlation and regression techniques. The findings revealed that credit risk management has a significant impact on the profitability of Nigerian banks. It concluded that banks' profitability is inversely influenced by the levels of loans and advances, non-performing loans and deposits thereby exposing them to great risk of illiquidity and distress.

Owojori et al (2011) highlighted those available statistics from the liquidated banks clearly showed that inability to collect loans and advances extended to customers and directors of companies, relatives to directors/managers was a major contributor to the distress of the liquidated banks. At the height of the distress in 1995, when 60 out of the 115 operating banks were distressed, the ratio of the distressed banks' non-performing loans and leases to their total loans and leases was 67%. This deteriorated to 79% in 1996, to 82% in 1997 and by December 2002, the licenses of 35 of the distressed banks had been revoked.

On studies that found a direct relationship between credit risk and bank performance, Kosmidou, Tanna and Pasiouras (2005) examined the determinants of profitability of Domestic UK Deposit Money banks from the period of 1995 to 2012. The findings of their study provide the evidence that credit risk affect positively the bank profitability. The study carried out by Ben-Naceur and Omran (2008) to examine the impact of bank concentration, regulations, financial and institutional development on bank profitability in middle East and North Africa countries from 1989 to 2005, found that credit risk has positive and significant effect on bank profitability and cost efficiency.

Mekasha (2001) investigated credit risk management and its impact performance on Ethiopian Commercial Banks. The researcher used 10 years panel data from the selected commercial banks for the study, to examine the relationship between ROA and loan provision, non-performing loans and total assets. The study revealed that there is a significant relationship between bank performance and credit risk management.

Charles, Okaro Kenneth (2013) examined the impact of credit risk management on capital adequacy and banks financial performance in Nigeria. For this purpose, six banks were selected by using positive sampling technique. Data were obtained from the published financial statements from 2004 to 2009. Panel data model was used to estimate the relationship that exists among Loan Loss Provisions (LLP), Loans and Advances (LA), Non-performing Loans (NPL), Capital Adequacy (CA), and Return on Assets (ROA). Results showed that sound credit risk

management and capital adequacy related positively on banks' financial performance with the exception of loans and advances which was found to have a negative impact on banks' profitability in the period under studiedBased on the findings, they recommended that Nigerian banks establish appropriate credit risk management strategies by conducting rigorous credit appraisal before loan disbursement and drawdown. It is also recommended that adequate attention be paid for Tier-one capital of Nigerian banks.

Kolapo, Ayeni and Ojo (2012) using panel data regression for the period 2000 to 2010 found that the effect of credit risk on bank's performance measured by the Return on Asset (ROA) of banks is cross-sectionally invariant. They concluded that the nature and managerial pattern of individual firms do not determine the impact. Also, Hosna, Manzura and Juanjuan (2009) reemphasized the effect of credit risk management on profitability level of banks. They concluded that higher capital requirement contributes positively to bank's profitability.

Muhammed, Shahid, Munir and Ahad (2012) used descriptive, correlation and regression techniques to study whether credit risk affect banks performance in Nigeria from 2004 to 2008. They also found that credit risk management has a significant impact on profitability of Nigerian banks.

Li yuqi (2007) examined the determinants of bank's profitability and its implications on risk management practices in the United Kingdom. The study employed regression analysis on a time series data between 1999 and 2006. Six measures of determinants of bank's profitability were employed. They proxied Liquidity, credit and capital as internal determinants of bank's performance. GDP growth rate, interest rate and inflation rate were used as external determinants of banks profitability. The six variables were combined into one overall composite index of bank's profitability. Return on Asset (ROA) was used as an indicator of bank's performance. It was found that liquidity and credit risk have negative impact on bank's profitability.

Poudel (2012) appraised the impact of the credit risk management in bank's financial performance in Nepal using time series data from 2001 to 2011. The result of the study indicates that credit risk management is an important predictor of bank's financial performance. Fredrick (2010) demonstrated that credit risk management has a strong impact on bank's financial performance in Kenya.

Meanwhile, Jackson (2011) towed the line of Fredrick (2010) by using CAMEL indicators as independent variables and return on Equity as a proxy for banks performance. His findings were also in line with that of Fredrick who also concluded that CAMEL model can be used as proxy for credit risk management. Musyoki and Kadubo (2011) also found that credit risk management is an important predictor of bank's financial performance; they concluded that banks success depends on credit risk management.

MODEL SPECIFICATION

The functional model of the study becomes

$$ROA = f(NPL/L, LA/TA) \text{ ---------- (1)}$$

$$ROE = f(NPL/LA, LA/TA) \text{ ----------(2)}$$

Where;

- **ROA:** Return on Assets (which is obtained as a ratio of Profit after Tax to Total Assets (PAT/TA) *100)
- **NPL:** Ratio of Non-Performing Loan to Loans and Advances: (NPL/LA) *100
- **LA:** Ratio of Loans and Advances to Total Assets.

$$ROA = \beta_o + \beta_1(NPL) + \beta_2(LA) + \mu_t \text{ ----------(3)}$$

Where; β_1 and β_2 are the partial slope coefficients or parameters of the independent variables, NPL and LA respectively, β_0 is the intercept term or constant variable in each of the models, and μt is the disturbance term (error term).

A Priori Expectation

The 'a priori expectation' in the model is that the independent variables, NPL and LLP are expected to have an inverse relationship with bank performance while LA is expected to have positive relationship. The mathematical expression is represented as; $\beta_1, \beta_2, < 0$; $\beta_2 > 0$.

Note that in the models: NPL = (NPL/LA) *100; LA = (LA/TA)*100.

DATA SOURCES

For this study, secondary data was collected. The data was obtained from Banks annual financial reports (2000-2021). The population of study comprises of (3) three quoted banks namely: First Bank of Nigeria Plc, United Bank for Africa Plc, and Access Bank Plc. The choice of the quoted Banks is due to their perceived stability, network of branches, size of workforce, public perception and profitability. The data used are aggregates for each variable obtained for the period 2000 – 2021. The period was chosen to cover to a reasonable extent the period of various reforms in the banking sector and because of the availability of data.

UNIT ROOT TEST

This paper carried out stationarity test of the variables using Augmented Dickey-Fuller (ADF).

The Augmented Dickey-Fuller (ADF) test for unit roots was conducted for all the time series employed for the study. A variable is stationary when ADF values exceed the critical values.

The result of unit root test, in relation to FBN, Access Bank and UBA is summarized in table 4.1, 4.2 and 4.3 below. It shows that ROA, NPL and LA are stationary at first difference and as indicated.

Table 4.1: FBN

Variable	ADF VALUE	Critical Value at 10% level	Order of Integration
ROA	-4.914921	-2.681330	I(1)
LA	-3.635787	-2.690439	I(1)
NPL	-3.141406	-2.728985	I(1)

Source: Extracts from Result of Stationarity Test

Table 4.2: ACCESS BANK

Variable	ADF VALUE	Critical Value at 10% level	Order of Integration
ROA	-4.603969	-3.420030	I(1)
LA	-3.599136	-3.342253	I(1)
NPL	-2.240343	-1.081330	I(1)

Source: Extracts from Result of Stationarity Test

Table 4.3: UBA

Variable	ADF VALUE	Critical Value at 10% level	Order of Integration
ROA	-2.865332	-2.681330	I(1)
LA	-2.957938	-2.681330	I(1)
NPL	-2.927268	-2.681330	I(1)

Source: Extracts from Result of Stationarity Test

PRESENTATION OF REGRESSION RESULTS

FBN

Dependent Variable: ROA				
Method: Least Squares				
Sample: 2000 2015				
Included observations: 16				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.370609	1.378706	-1.719445	0.0092
NPL	-0.006575	0.009452	-0.695570	0.0498
LA	0.016563	0.032666	0.507056	0.6206
R-squared	0.317939	Mean dependent var		2.013753
Adjusted R-squared	0.297622	S.D. dependent var		1.060344
S.E. of regression	1.007259	Akaike info criterion		3.019702
Sum squared resid	13.18941	Schwarz criterion		3.164563
Log likelihood	11.15762	Hannan-Quinn criter.		3.027120
F-statistic	10.81137	Durbin-Watson stat		1.944308
Prob(F-statistic)	0.002332			

The result shows that the variables NPL has inverse relationship with ROA, showing that NPL has a negative effect on bank performance.

This relationship is statistically significant at 95% confidence level and meets the a priori expectation. The result also shows that a unit increase in NPL will lead to 0.007unitdecreasein bank performance respectively *ceteris paribus*.

On the other hand, the relationship between LA and ROA is opposite that of other variables. The result shows that a positive insignificant relationship exists between them.

ACCESS BANK

Dependent Variable: ROA				
Method: Least Squares				
Sample: 2000 2015				
Included observations: 16				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.434757	0.835977	-2.912467	0.0121
NPL	-0.004045	0.042749	-0.010417	0.0118
LA	0.016440	0.012016	1.368099	0.1945
R-squared	0.454144	Mean dependent var		1.843125
Adjusted R-squared	0.440012	S.D. dependent var		0.964315
S.E. of regression	0.952667	Akaike info criterion		2.908258
Sum squared resid	11.79846	Schwarz criterion		3.053118
Log likelihood	-20.26606	Hannan-Quinn criter.		2.915676
F-statistic	9.184521	Durbin-Watson stat		2.366908
Prob(F-statistic)	0.036843			

The result shows that the variables NPL has inverse relationship with ROA, showing that NPL has a negative effect on bank performance. This relationship is statistically significant at 95% confidence level and meets the a priori expectation. The result also shows that a unit increase in NPL will lead to 0.004 unit decrease bank performance respectively *ceteris paribus*. On the other hand, the relationship between LA and ROA is opposite that of other variables. The result shows that a positive non-significant relationship exists between them.

UBA

Dependent Variable: ROA				
Method: Least Squares				
Sample: 2000 2015				
Included observations: 16				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.342914	0.814650	4.103495	-0.0012
NPL	-0.020731	0.012206	1.698479	-0.0132
LA	0.075197	0.027908	0.094466	0.0184
R-squared	0.386601	Mean dependent var		1.435625
Adjusted R-squared	0.292232	S.D. dependent var		0.978298
S.E. of regression	0.823031	Akaike info criterion		2.615716
Sum squared resid	8.805947	Schwarz criterion		2.760576
Log likelihood	-17.92573	Hannan-Quinn criter.		2.623134
F-statistic	14.096697	Durbin-Watson stat		1.868131
Prob(F-statistic)	0.041718			

Just as the cases of FBN and Access Bank, this result also shows that NPL has inverse relationship with ROA, showing that NPL has a negative effect on bank performance. A unit increase in NPL will lead to 0.02 unit decrease in bank performance respectively *ceteris paribus*. On the other hand, the relationship between LA and ROA is opposite that of other variables. The result shows that a positive non-significant relationship exists between them.

The relationship between the variables of the different banks can be stated as follows

- **FBN:** ROA = -2.370609-0.006575*NPL + 0.016563*LA
- **ACCESS BANK:** ROA = -2.434757-0.004045*NPL + 0.016440*LA
- **UBA:** ROA = -3.342914-0.020731*NPL + 0.075197*LA

RECOMMENDATIONS

From the findings, the followings policy recommendations are imperative to loan management and performance of Deposit Money Banks in Nigeria.

1. Deposit Money Banks in Nigeria should not only be concerned about profit maximizing in a complex and competitive market as we have now. While taking out loans and advances, due diligence should be done in their loan management.
2. Credit risk management should have a wider coverage (integrating other forms of risk as defined in Enterprise Risk Management) to bring about more efficient loan management in Deposit Money Banks.
3. The researcher recommends the need to strengthen supervision of banks by the Central Bank of Nigeria (CBN) and the Nigeria Deposit Insurance Corporation (NDIC) to prevent buildup and accumulations of NPLs in the future. The Central Bank of Nigeria (CBN) should regularly assess the lending attitudes of financial institutions. There is therefore need to strengthened bank lending rate policy through effective and efficient regulation and supervisory framework.
4. Training and retraining to enable employees of Deposit Money Banks acquire the latest skills on loan management.

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Lighting Optimization for Efficiency, Cost, and Carbon Emissions Reduction: Overview, Methodology and Case Studies

Nicolas Toussart

Abstract:
All buildings owners tend towards lighting with high energy efficiency, great performance, low carbon emissions, easy maintenance, and at reduced costs. Several parameters determine the choice of lamp: luminous efficiency (in lumens per watt), economic life (in hours), colour rendering index (CRI), colour temperature (in kelvins, K) and the power (in watts, W). This paper analyses the possibilities of lighting optimization trough an overview of the current literature, methodology definition and real case studies.

Keywords: Lighting efficiencies, LED, Movement and presence sensor

INTRODUCTION

On a daily basis, light plays an essential role: it contributes to our health, our safety and our dynamism, improves our working conditions and increases our performance, but it also participates in the beautification of spaces, the enhancement of interior architecture.

Since the Kyoto agreements, the impact of lighting on the environment has been recognized: in non-residential buildings, it can represent up to 40% of electricity consumption. Nevertheless, up to 70% of this consumption could be saved by replacing old luminaires with more efficient modern systems [1]. In most cases, such investments are quickly profitable, and they often improve the quality of lighting.

Less bulky, more efficient, more energy-efficient, the products are constantly being renewed, always offering more possibilities: long-life lamps with high luminous efficiencies, more efficient and smarter luminaires thanks to simple automation, electronic control systems that now allow to benefit from more flexible installations, and programmable lighting scenarios according to the desired effects and atmospheres.

It is therefore through a judicious choice of materials, associated with compliance with lighting standards, that the quality of lighting can be improved, and that savings can be made, provided that the return on investment is calculated in terms of overall cost and to use products with high energy efficiency.

For example, for teaching premises, quality lighting is sought for improving school performance. If lighting alone is not enough to stop the academic difficulties met by children from kindergarten to university, it can nevertheless greatly contribute to improve their environment, their comfort, their visual perception, and this, at a cost of reduced operation (consumption and maintenance) thanks to the use of high-performance equipment and in compliance with the requirements of national or/and international standard such as European standard EN 12464-1 [2].

Another example, offices require efficient lighting for good working conditions.

Working in good conditions serves the interest of both the business owner and his Employees. Poor quality lighting makes visual tasks more difficult, slows down the pace Workload, increases fatigue and generates excessive operating costs.

Fig. 1 is an example of spatial light distribution of an office (annual average illuminance on the work plane and at the eye-level of each workstation) [3]. Fig. 2 is also an example of results of luminance distribution measurements and the corresponding street pictures [4].

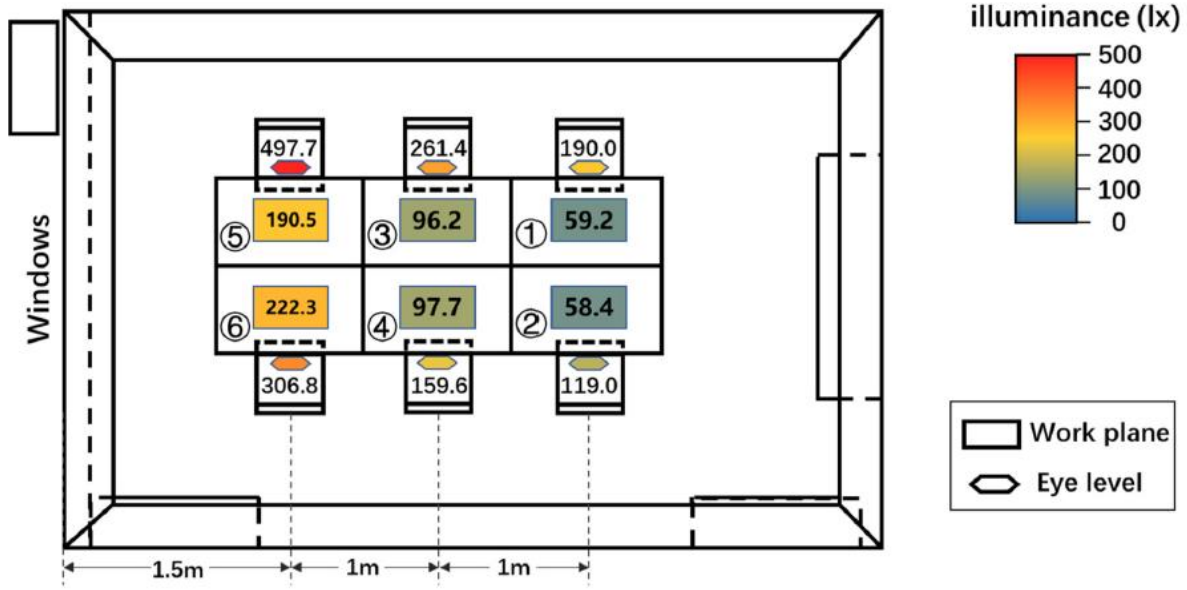

Fig. 1. Example of spatial light distribution of an office [3]

Fig.2. Left picture shows the street picture, and the right picture shows the luminance distribution

METHODOLOGY

Audit

The methodology is based on audit that allows to identify, test, and describe solutions whose characteristics will be as follows [5, 6]:

- adequate luminosity in quantity (illuminance level) and quality
- rapid return on investment thanks to the energy savings obtained
- adaptation to existing supports
- maximized saving of daylight depending on the contribution of natural light [7]

Adequate Brightness:
It is necessary to carry out brightness tests in different configurations, comparing the illumination obtained under the existing conditions and with the different solutions considered.
In relation to the brightness levels obtained, the objective is to provide the right lighting with regard to the recommendations in order to optimize energy savings.

Return on Investment:
Due to the general requirement given for a rapid return on investment on the one hand and that the locations of the lighting devices cannot be modified on the other hand, field solutions are relatively limited, with the imperative of working on modifying existing devices to find adaptation solutions.

Indeed, solutions such as the replacement of complete devices as well as the rewiring of devices to introduce electronic ballast or LED driver technology sometimes prove to be complicated: Firstly because of the cost of supply and secondly second because of the labour time work necessary for the operation.

***Adaptation to Existing Supports*:**
The objective is to find simple solutions that do not require a major modification of the internal lighting system, both in terms of optics and electrical equipment.

Use of Daylight Supply:
The contribution of daylight available in the circulations can make it possible to carry out savings in daylight hours, the installation of cells to automatically manage turning off superfluous electric lighting [8].

Qualitative Lighting Criteria
The quality of environment lighting (example: workplace) is assessed according to various criteria:

The Amount of Light Available:
The quantity of light or level of illumination is measured in lux - by means of a luxmeter.

For a given task and/or type of room, the level of illumination must never be lower than at a reference value (a national or international norm for example).

This value depends on the precision of the task and the size of the pieces worked (example: a minimum brightness of 150 lux for workshop work).

In a lighting renovation situation, it is important to take a margin in relation to the minimum illuminances required to consider the effects of lighting dimming in the time.

Lighting Uniformity:
The level of illumination is never identical at all points in a room. It is important that there are no too large differences in brightness that prevent correct accommodation when the operator moves [9]. A good homogeneity is obtained by a judicious choice and installation of lighting devices in the room and around the workstation.

Lighting Atmosphere: Colour Rendering and Colour Temperature:
A good lighting atmosphere is essential for staff satisfaction and a good productivity in their work environment. This lighting atmosphere depends essentially on the type of light source (or lamp) used for lighting.

It is essential that the lamps used allow faithful reproduction of the colours – of the furniture, of the worktop, of the worked pieces – to give a good perception of details and avoid errors, especially during the control phase for example.

The degree of colour restitution called CRI (colour rendering index) is measured on a scale of 100. A minimum of 80 is required for workstation lighting, regardless of its nature [10].

On the other hand, the lamps must have an apparent colour that is both in harmony with the work environment and in correlation with the level of illumination (example: tint of warm colour for the reception hall, offices, cooler colour shade for brightly lit rooms requiring a toned light suitable for precision work).

Protection Against Glare:
Independent of the amount of light, this is an essential criterion, especially for workstations requiring strong visual concentration (work on a display screen, monitoring or work of fine parts...).

Glare is caused either directly by the presence of lighting (natural or artificial) in the field of vision of the operator, either indirectly by the reflection of the lighting on bright or shiny surfaces or a display screen.

The limitation of glare is obtained:
- by the implementation of qualitative lighting devices equipped with optics (reflectors and so-called scroll grilles) masking the view of the lamps
- by properly positioning the lighting fixtures in relation to the workstation and the position of people
- by an adequate location of the workstations in relation to the walls diffusing natural lighting (windows, overhead lighting).

Lighting Standards:
Many organizations have established standards that address lighting design, safety, performance, mounting, and testing, as well as illumination levels [10]. Below, some examples:
- IEC 62504:2014+A1:2018 ➔ Light emitting diode (LED) products and related equipment
- NEMA SSL 1-2016 ➔ Electronic Drivers for LED Devices, Arrays or Systems
- ANSI C82.11-2023 ➔ American National Standard for Lamp Ballasts—High Frequency Fluorescent Lamp Ballasts

RESULTS - CASE STUDIES

This section contains different relevant case studies among the literature on lighting efficiency.

Case Study #1: Street Lights [12]

Outdoor lighting can be defined as the lighting of roads, pedestrian and bicycle ways, parks, and other areas during the night times. Outdoor lighting is needed for safety and comfort. Energy Agency (IEA) statistics, where lighting has been estimated to account for approximately 19% of global electricity consumption. Outdoor lighting devices consume 15 to 20% of global lighting consumption.

This case study is about the possible energy saving for outdoor lightings on a university campus in Turkey.

Various scenarios have been developed in order to save electrical energy used for outdoor lighting and four scenarios have been built for this purpose. The first scenario is to switch off some lightings after 23:30; the second scenario is dimming the lamps; the third scenario is to replace the current LED lamps with energy efficient ones and the fourth scenario is to use the last two scenarios together.

Table 1 contains a summary of the savings for each scenario.

Table 1: Energy consumptions, savings and CO_2 emissions for all scenarios

	Installed power (kW)		Energy consumption (MWh/year)	CO2 emission (tCO2/year)	Energy saving (MWh/year)	CO2 saving (tCO2/year)	Energy-saving (%)
	Before 23.30	After 23.30					
Current Status	302.92	302.92	1290	426	–	–	–
scenario 1	302.92	65.40	656	216	634	209	49%
scenario 2	302.92	151.46	886	292	404	133	31%
scenario 3	180.58	180.58	769	254	521	172	41%
scenario 4	180.58	90.29	528	174	762	251	60%

The cost of installation of LED lighting systems is more expensive than other lighting systems. But, the wide usage of LED lighting systems is inevitable due to the long lifetime, the decrease in purchase prices compared to the previous years, increasing efficiency factors, and the increasing electricity prices [13, 14]. The analysis demonstrates that it is possible to save up to 60% of electricity consumption with the improvements required in the lighting systems proposed in this study.

Case Study #2: Industrial Buildings [5]

The site of this case study is an industrial site of a famous manufacturing/mining holding in Zimbabwe.

A walk-through audit was conducted. The main objective of the walk-through energy audit was to assess the illumination requirement of the plant and scope of improvement of illumination quality and level.

The light levels in the plant and selected offices were measured during daytime by using a lux/light meter. Measurements were taken at a number of points and averaged.

After the energy audit survey and detailed data analyses, the energy audit team put forward the following recommendations to implement:

- Switching of lights: The calculations show that the company would save US$614.40 per day per flood light by making sure that each flood light is switched OFF.
- There is need for the responsible personnel to remind personnel or office occupants to switch OFF office lights and utilize daylight [15]. This can be done by putting stickers at the doors of each office as shown in fig.3.
- Replacing T8 and T12 fluorescents with LEDs and Replacing HPS (high pressure sodium) lights with LEDs

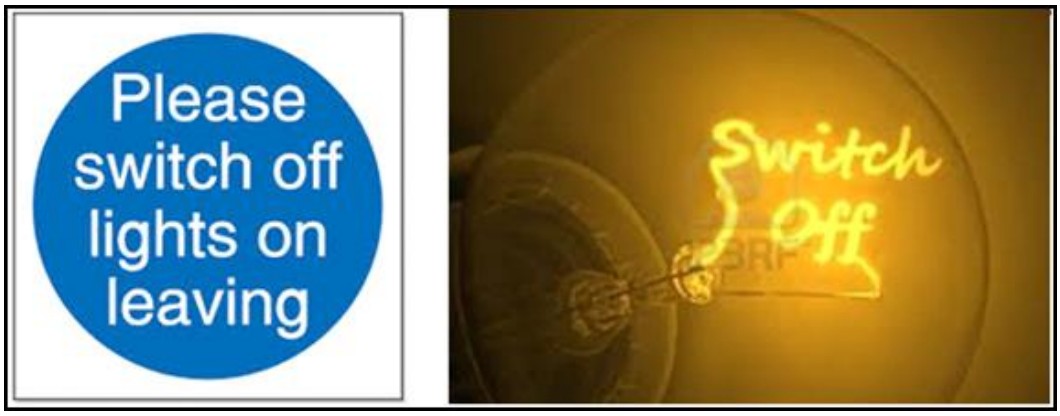

Fig. 3. Poster on doors of each office

It has been demonstrated in this specific case study that the improvement of lighting technologies can determine a significant reduction of electricity consumption. Savings are shown in table 2.

Table 2: Simple Payback period (spp) results

Existing type	Recommended Actions	No. Of replaced bulbs	Fixtures changed	*AES (kWh)*	*ADS (kVA)*	*ACS (US$/year)*	*Implem. Cost*	*SPP (year)*
400W HPS	bulb 80W LED	130	130	364 416	499.2	48 677.0	*37 700*	*0.77*
58W T8 Flu. bulb	20W T8 LED	357	0	158 784	217.5	21 209.3	*24 804*	*1.2*
36W T8 Flu. bulb	15W T8 LED	54	0	9 934	55.4	1 496.5	*2 268*	*1.5*
18W T8 Flu. bulb	8W T8 LED	13	0	1 139	1.6	152.3	*351*	*2.3*
TOTAL				*534 273*	*773.7*	*71 535.1*	*65 123*	0.91

AES - annual energy savings; ACS annual cost savings

Case Study #3: Residential Buildings [16]

This case study presents an energy audit study of two commercial buildings in Dhaka (Bangladesh) and a tool that has been developed to facilitate energy audit of commercial

buildings. The tool is developed using Microsoft Visual Basic Application and named "EnergyWise".

The study showed that the present electrical energy usage of the commercial buildings in Dhaka are quite inefficient and up to 8-15% in electrical equipment and 28-45% in lighting section of energy consumption can be appreciably reduced. Subsequently, the cost reduction can be achieved by feasible replacements.

Fig. 4 shows the percentage of total energy cost due to different types of lights. The chart is obtained using EnergyWise.

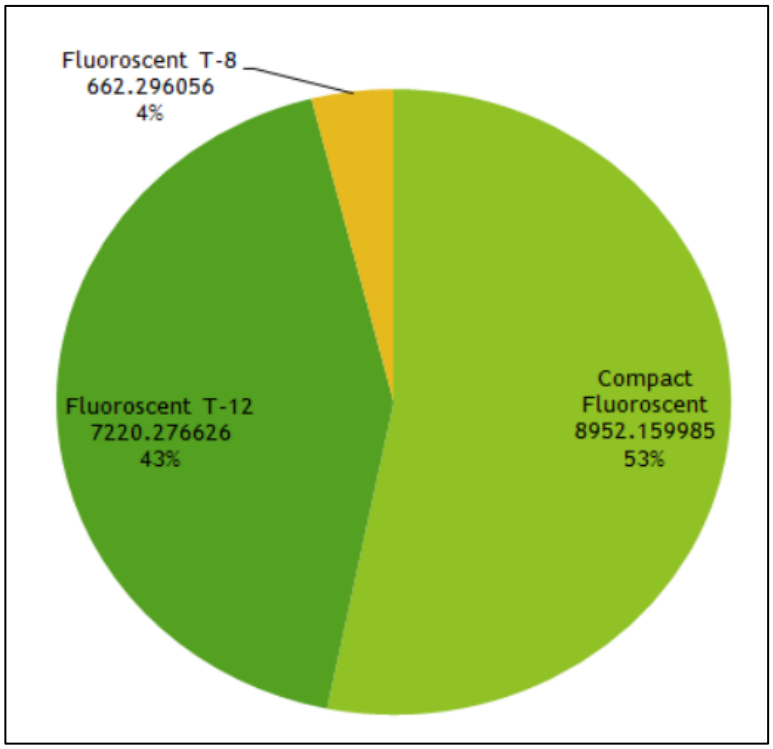

Fig. 4. Percentage of total energy cost due to different types of lights

Illumination level is measured using digital Lux meter which gives the output of light directly in Lux. Illumination level is required to determine if the present light level is adequate or more than necessary so that the auditor can reduce the number of lights to save energy. Measured light level is 743.02 Lux per room but for educational institutions recommended illumination level is 300 Lux per room according to Bangladesh National Building Code, BNBC (2011)

Replacement of T-8 (15 W), T-12 (36W), CFL (14W, 23W, 65W) by respectively LED Tube light (8W and 16W) and Led Lamps (9W, 14W, 33W).

Energy and Cost Saving After Replacement:

For building 1: 6,936.44 kWh and 67,977 BDT (Percentage Savings for lighting vs other equipment = 28,8%)

For building 2: 20,386.695 kWh; 199,790 BDT (Percentage Savings for lighting vs other equipment = 41,5%)

DISCUSSION

Manage To Reduce Losses

Below are 4 of the most common lighting management configurations [17, 18]. Compared to a luminaire equipped with a conventional ferromagnetic power supply, energy consumption is reduced by 25 to 50%. Gains of 70% can be achieved with more complex setups.

1. Luminaire with electronic power supply: 25%
2. Luminaire with dimmable electronic power supply and light management cell or presence detection: 35
3. Luminaire with electronic power supply manual dimmer OR with clock and time programming: 50%
4. Luminaire with electronic power supply manual dimmer AND with clock and time programming: 70%

Movement And Presence Detectors

They control the switching on and off of the lighting by infrared detection. The sensor detects the presence and movement of a person by the emission of heat it gives off. The signal is sent to the lights which turn on immediately. The detector ensures the automatic extinction of the premises as soon as there is no longer anyone and movement. Some systems provide for a gradual lowering of the level of illumination, step by step, down to a pilot level. To prevent lamps from failing prematurely, electronic ballasts should be of the "hot start" or "hot cathode" type.

Galitsky et al. [19] found that energy up to 10–20% can be saved with the use of occupancy sensors.

Level of Illumination Variation

The dimming makes it possible to adapt the level of lighting to the needs. It also offers the possibility of permanently maintaining the same level of illumination. A photoelectric cell measures the contribution of natural light and modulates the artificial lighting accordingly. This solution is particularly appreciated in teaching premises which generally have large bay windows. This prevents the teacher from moving around and guarantees constant visual comfort.

As the consumption of the tubes decreases when the level of lighting drops, the variation automatically generates energy savings.

Today, presence detection and dimming are frequently associated. This device is inexpensive from the point of view of the electrical installation (no more switches or vertical wiring).

Lighting Management System

Ambience management systems offer the possibility of saving and programming several lighting scenarios that the user can simply activate and modify according to his needs, at any time, using a remote control, a wall-mounted touch screen, or even via his computer [20, 21]. Presence detection functions, dimming of lighting according to natural light, and programming of scenarios can also be combined within a centralized system which makes it possible to manage several rooms in the building, and to easily modify the organization of the lighting of the space without having to intervene on the installation [22].

Maintenance

Over time, the average illuminance levels of a lighting installation decrease and this decrease results from four factors:

- drop in the luminous flux of the lamp during its lifetime,
- number of faulty lamps between two replacement operations system of lamps,
- dusting of light fixtures,
- fouling of the room.

According to Khalid et al. [23], maintenance is one of the important aspects of energy conservation. Maintenance includes both cleaning and re-lamping.

Electronic ballasts also have the advantage of eliminating the flickering of the lamps as well as their flashing at the end of their life, which is particularly unpleasant and costly in maintenance [24].

CONCLUSION

All buildings owners tend towards lighting with high energy efficiency, performance, and easy maintenance and at reduced costs. The flexibility of the installation must also allow rearrangements of the space according to the needs of the company, and the lighting must be able to be modified easily without leading to additional costs.

For employees, lighting must enable them to do their work in the best possible conditions: ergonomic lighting, quality of light that improves visual perception, and therefore performance, and simple use that allows everyone to intervene, for example by varying the levels of illumination.

Several parameters determine the choice of lamp: luminous efficiency (in lumens per watt), economic life (in hours), colour rendering index (CRI), colour temperature (in kelvins, K) and the power (in watts, W).

Machine learning approach to evaluate the energy and cost-saving opportunities (lighting included) should be subject to further research [25].

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Performance of Different Varieties of Jasmine (*Jasminum sambac*) Under Prayagraj Agro-Climatic Conditions

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Abstract:
The present investigation entitled Performance of different varieties of jasmine (Jasminum sambac) under Prayagraj agro-climatic conditions. was undertaken in the Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, during August, 2021 to October, 2022. The experiment was laid out in Randomized Block Design (RBD) with 07 varieties, replicated thrice. The variety V4 (U.P. Local) performed significantly better for all the growth parameters like plant height (95.57 cm), number of leaves (118.50), plant spread (60.45 cm), and number of branches (24.50). Variety V5 (Gundumalli) was found superior in terms of bud diameter (24.83 mm), shelf life (5.58 days), average flower bud weight (0.75 g), flower yield per plant (1.46 kg), flower yield per hectare (58.4 q), and benefit cost ratio (4.15). So, this variety can be used for better quality, flower yield and benefit cost ratio. Hence the variety V5 (Gundumalli) can be recommended for commercial cultivation under Prayagraj agro-climatic conditions.

Keywords: jasmine, varietal evaluation, genotypes, growth, yield and quality

INTRODUCTION

Jasmine is a genus of shrubs and vines in the olive family (Oleaceae). For the past many centuries' jasmines have adorned the gardens of central and South East Asia, Afghanistan, Iran, Nepal and many other tropical and sub-tropical countries and many of the jasmine species are native of India and have their origin in the southern foothills of the Himalayas. The basic chromosome number of jasmines is 13, while 2n ranges from 26 to 39, though most of them are diploid. The name Jasmine is of Persian origin and means "gift from God." It is derived from the Persian word "yasmin" which is used for the flower.

Jasmines are commercially cultivated for their flowers in the Southern and Eastern parts of India. Major jasmine producing states in India are Tamil Nadu and Karnataka. Karnataka, is known for cultivation of jasmines due to its versatile utility as fresh flowers in ceremonies, religious offerings and perfuming the hair oils etc. It is a highly valued ornamental plant for home gardens and commercial cultivation. Flowers and buds are used for making garlands, bouquets and for religious offerings, while vein is used as hair adornment.

The Jasmine species *Jasminum sambac* Ait. is distributed mainly in Karnataka, Andhra Pradesh, TamilNadu and also to some extent in West Bengal states of India (Bhattacharjee *et al.* 1983). Hence, the great extent of variability is available in *J.sambac* Ait. from this region. Essential oil is extracted from the flowers to make perfumes. The different parts of *J.sambac* such as the leaf, stem, bark and roots are important as source of chemicals that are useful in the pharmaceutical industries.

The number of species in the genus *Jasminum* varies from about 200. environment / season is the important limiting factor for growth and flowering of jasmine. The variations among jasmine varieties are largely in response to theenvironment particularly temperature and the interaction between temperature and variety. Hence, there is a need to evaluate promising genotypes, so that elite genotypes could be recommended for specific locations.

MATERIALS AND METHODS

This chapter contains the details of the materials used and the methods adopted in the present study entitled "Performance of different varieties of jasmine *(Jasminum sambac)* under Prayagraj agro-climatic conditions" was carried out during August, 2021 to October, 2022 in the Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj. The planting material was collected from Kerala Agricultural College, Mannuthy, Thrissur. The study comprised of 7 varieties and 3 replications. Single Mogra, Arka Aradhana, Double Mogra, U.P Local, Gundumalli, Iruvachi and Erkil Jasmine these are the varieties. The experiment was laid out in RBD.

Table .1: Meteorological data recorded during experimental period (August, 2021 to October, 2022)

Month	Week	Temperature (ºC)		Relative humidity (%)		Rainfall (mm)
		Max.	Min.	Max.	Min.	
August, 2021	1st	33.0	25.2	89.2	66.4	17.9
	2nd	31.9	24.97	91.2	69.7	19.0
	3rd	33.1	25.5	89.1	64.1	13.7
	4th	33.6	25.6	88.64	61.9	14
September, 2021	1st	35.6	26.1	88.7	55.7	10.7
	2nd	34.7	26.3	86.5	56.8	5.7
	3rd	33.7	25.8	89.0	61.5	14.4
	4th	34.1	34.3	89.2	59.7	13.4
October, 2021	1st	34.2	25.5	87.5	57.7	1.5
	2nd	34.8	25.8	85	55.4	0.7
	3rd	35.0	25.8	85.	55	1
	4th	35.1	25.7	85.8	54.8	1.1
November, 2021	1st	30.7	18.1	91.1	58.8	0
	2nd	30.3	16.8	91	57.1	0
	3rd	29.8	15.9	91.4	57.2	0
	4th	29.6	15.2	91.6	57.8	0
December, 2021	1st	28.4	13.8	93.2	59.7	0
	2nd	27.6	12.8	93.7	60.4	0
	3rd	26.64	12.	94.1	62	0
	4th	25.4	11.4	94.5	66.4	0
January, 2022	1st	19.8	9.1	96.8	81.8	2.7
	2nd	19.51	10.8	96.8	81.1	3.6

	3rd	19.9	9.5	96.5	78.6	2.4
	4th	20.3	9.3	96.1	77.1	2
February, 2022	1st	26	11.8	93.4	56	0
	2nd	27.8	10	95	62	0.00
	3rd	28.8	12.4	91	53	0
	4th	32	14	89	41	0
March, 2022	1st	33.2	15.1	87	46	0
	2nd	33.6	16.2	88	46	0
	3rd	39.2	18	73	37	0
	4th	41.1	22	68	35	0
April, 2022	1st	40.1	22.4	79.8	38.7	0
	2nd	41.3	23.7	77.7	38.5	0
	3rd	42.4	23.5	82.2	39.5	0
	4th	43.8	24.6	75.7	38.4	0
May, 2022	1st	43.2	24.5	82	41	0
	2nd	42.7	24.8	75	40	0
	3rd	42.1	26.2	76	37	0
	4th	42.5	25.6	74	35	0
June, 2022	1st	44.7	28.08	82.71	27	0
	2nd	44.61	28.94	78.71	24.85	0
	3rd	39.98	28	78.28	36	0
	4th	39.24	26.24	81.57	40.28	0
July, 2022	1st	34.82	28.04	79.57	40.71	0
	2nd	38.14	28.52	78.85	40.14	0
	3rd	38.54	27.94	71.57	37.28	0
	4th	36.71	25.25	91.71	56.71	15.6
August, 2022	1st	36.09	25.41	93	50.28	0.95
	2nd	35.05	24.51	92.85	57.57	0.48
	3rd	34.12	24.3	92.57	55.57	15.21
	4th	35	24.32	90.57	54.71	13.82
September, 2022	1st	35.48	26.22	88.85	53.85	1.07
	2nd	34.57	26.45	90	57	5.27
	3rd	32.14	24.71	91.28	66.57	12.91
	4th	31.74	25.54	90.57	67.42	11.34
October, 2022	1st	33.34	25.77	90.42	67	4.34
	2nd	32.01	24.97	94	69.57	7.08
	3rd	32.08	21.2	92.42	59.42	0
	4th	32.02	18.4	92.85	56.28	0

RESULTS AND DISCUSSION

Performance of Jasmine Cultivars for Vegetative Parameters

There were significant differences among the varieties concerning vegetative parameters (Table 2). Significantly taller plants (95.57 cm) were reported in variety V4 (U.P. Local), followed by variety V5 (Gundumalli, 90.54 cm) while shorter plants (54.53 cm) to observed in variety V2 (Arka Aradhana). The significant variation concerning plant height among the chrysanthemum varieties was also noticed by Joshi *et al.* (2010) Significantly a greater number of leaves (118.50) per plant were reported in variety V4 (U.P. Local), followed by variety V5 (Gundumalli, 116.50) while lesser number of leaves (99.50) was observed in variety V2 (Arka Aradhana). Similar observations were observed by Jawaharlal *et al*. (2013) in carnation and Vedavathi *et al.* (2015) in Asiatic lily. The variation in number of leaves per plant under different varieties, might be due to difference in their genetic inherit capacity and suitability under this climate. Significantly wider plant spread (60.45 cm) were recorded in variety V4 (U.P. Local), followed by variety V5 (Gundumalli, 58.46 cm) whereas smaller plant spread (42.70 m) was obtained in variety V2 (Arka Aradhana). The difference in plant spread among all the varieties may be due to their genetic makeup and development of a greater number of secondary branches in the varieties thereby increasing the plant spread. Similar results were recorded in chrysanthemum by Henny *et al*. (2021). Significantly a greater number of branches (24.50) were recorded in variety V4 (U.P. Local), followed by variety V5 (Gundumalli, 23.42) while lesser number of branches (16.50) was observed in variety V2 (Arka Aradhana). The difference in number of branches may be due to the genetic makeup of the varieties and due to environmental conditions. Similar results were recorded in chrysanthemum by Henny *et al*. (2021).

Performance of Jasmine Cultivars for Quality Characters

There were significant differences among the varieties concerning quality parameters (Table 3). Significantly larger flower bud length (2.59 cm) was reported in variety V7 (Erkil Jasmine), followed by variety V5 (Gundumalli, 2.26 cm) while shorter flower bud length (1.37 cm) was observed in variety V1 (Single Mogra). The difference in flower bud length may be due to the inherent character and genetic makeup of the varieties and environmental conditions, similar results were recorded in Asiatic lily by Barik *et al.* (2013), Pandey *et al.* (2012), Sindhu *et al.* and Singh *et al.* (2012). Significantly larger flower bud diameter (24.83 mm) was reported in variety V5 (Gundumalli) followed by V4 (U.P. local, 17.08mm) while small flower bud diameter (2.25 mm) was observed in variety V2 (Arka Aradhana). The difference in flower diameter may be due to the variation in the genetic makeup of the varieties. Similar results were recorded in chrysanthemum by Siddiqua *et al.* (2018). Significantly more average bud weight (0.75 g) was reported in variety V5 (Gundumalli), followed by varietyV3 (Double Mogra, 0.41g) while lesser Average bud weight (0.16 g) was observed in variety V2 (Arka Aradhana). The difference in the flower weight may be due to the varietal character, habitat type and genetic makeup of the varieties. Similar results were recorded in chrysanthemum by Patil *et al.* (2017). Significantly more shelf life (5.58 days) was reported in variety V5 (Gundumalli), followed by variety V3 (Double Mogra, 4.17 days) while less shelf life (2.25 days) was observed in variety V7 (Erkil Jasmine). The difference in the shelf life of flowers may be due to the evaporation rate, transpiration rate of the varieties and also may be due to the varietal character, habitat type and genetic makeup of the varieties. Similar results were recorded in chrysanthemum by Roopa *et al.* (2018).

Performance of Jasmine Cultivars for Yield Characters

There were significant differences among the varieties concerning yield parameters (Table3). Significantly higher flower yield per plant (1.46 kg) were reported in variety V5 (Gundumalli), followed by variety V1(Single Mogra, 1.21kg) while low flower yield per plant (0.37 kg) was observed in V2 (Arka Aradhana). The difference in the flower yield per plot may be due to the varietal character, habitat type and genetic makeup of the varieties. Similar results were recorded in chrysanthemum by Srilatha *et al.* (2015). Significantly higher flower yield per hectare (58.4 q) were recorded in variety V5 (Gundumalli), followed by variety V1(Single Mogra, 48.4 q) while less flower yield per hectare (14.8 q) was observed in variety V2 (Arka Aradhana). The difference in the yield per hectare may be due to varietal character, habitat type and genetic makeup of varieties. Similar results were recorded in chrysanthemum by Singh *et al*. (2017), Sindhu *et al.*, (2006).

Table.2 Performance of Jasmine cultivars for vegetative parameters under Prayagraj agro-climatic conditions.

Variety	Plant Height	Number of Leaves	Plant Spread	Nunmber Of Branches
SINGLE MOGRA	78.47	115.5	50.58	22.25
ARKA ARADHANA	54.53	99.5	42.7	16.5
DOUBLE MOGRA	65.49	105.25	43.68	20.5
U.P. LOCAL	95.57	118.5	60.45	24.5
GUNDUMALLI	90.54	116.5	58.46	23.42
IRUVATCHI	76.75	108	48.46	18.33
ERKIL JASMINE	56.58	102.25	42.83	17.33
F - test	**S**	**S**	**S**	**S**
S.Ed (±)	0.18	0.28	0.19	0.27
C.D. (0.05)	0.38	0.61	0.42	0.6
C.V.	0.29	0.31	0.48	1.64

Table. 3 Performance of Jasmine cultivars for quality parameters yield parameters and benefit: cost ratio under Prayagraj agro-climatic conditions.

Variety	Flower Bud Diameter (Mm)	Average Flower Bud Weight(G)	Shelf Life Of Loose Flower (Days)	Flower Yield/Ha (Q)	Benefit Cost Ratio
Single Mogra	8.17	0.33	3.08	48.4	3.44
Arka Aradhana	2.25	0.16	2.42	14.4	1.05
Double Mogra	13.75	0.41	4.17	22.4	1.59
U.P. Local	17.08	0.37	2.42	43.2	3.07
Gundumalli	24.83	0.75	5.58	58.4	4.15
Iruvatchi	17.08	0.27	3.33	23.2	1.64
Erkil Jasmine	3	0.25	2.25	16	1.13
F - test	**S**	**S**	**S**	S	
S.Ed (±)	0.34	0.01	0.12	0.13	
C.D. (0.05)	0.74	0.02	0.26	0.29	
C.V.	3.39	3.35	4.35	0.5	

CONCLUSION

From the present investigation entitled "Performance of different varieties of jasmine (*Jasminum sambac)* under Prayagraj agro-climatic conditions", it is concluded that the variety V4 (U.P. Local) performed significantly better for all the growth parameters like plant height, number of leaves, plant spread, and number of branches, while in terms of flowering parameters, variety V1 (Single Mogra) was found superior in terms of days to first flower bud initiation, number of flower bud, 50% flowering and duration of flowering, and the variety V5 (Gundumalli) was found superior in terms of bud diameter, shelf life, average flower bud weight, flower yield per plant, flower yield per hectare, gross return, net profit, and benefit cost ratio. So, it can be used for better quality, flower yield and benefit cost ratio. Hence the variety V5 (Gundumalli) can be recommended for commercial cultivation under Prayagraj agro-climatic condition.

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