

# Utilization of Non-pneumatic Anti-shock Garment and Associated Factors among Health Care Professionals at Public Hospitals of Addis Ababa, Ethiopia, 2021

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**Abstract:** Background: Non-pneumatic anti-shock garments (NASGs) are simple systems that use lower body counter pressure to reverse hypovolemic shock and reduce blood loss caused by obstetric hemorrhage. Each year, obstetric hemorrhage (OH) causes more than a quarter of all maternal deaths worldwide. One of these promising advances is the use of non-pneumatic anti-shock garments (NASGs). Despite this, NASG treatment is only used in a few cases to prevent postpartum hemorrhage, save the mother's life, and studies on its utilization and associated factors are not widely available. Objective: To assess the utilization of non-pneumatic anti-shock garments and associated factors among health care professionals at public hospitals in Addis Ababa, Ethiopia 2021. Method: An institution-based cross-sectional study design and quantitative data collection methods were conducted from March 31 to April 15/2021. A total of 388 randomly selected healthcare professionals working in the maternity health care unit at a public hospital in Addis Ababa were included. The data were cleaned and coded then entered into EPI data version 3 and exported to SPSS version 25 for further analysis. Logistic regression was used to identify factors associated with NASG utilization. Variables were first analyzed with Bivariate ( $p < 0.2$ ) and then multivariate logistic regression model and considered statistically significant at a P-value of  $< 0.05$ . The adjusted odds ratio with a 95% CI interval was used to determine the degree and direction of the association between covariates and the outcome variable. Results: A total of 377 (97.1%) health professionals participated in this study. In this study, the prevalence of NASG Utilization was 39.3% which was low. The study indicated that the female participant were 3 times more likely to use NASG 2.568 (1.198-5.502), being (General Practitioner) 88% less likely than midwives AOR=.95% CI. 122 (.025-.705), being not trained on non-pneumatic anti-shock garments, Not aware of the existence of the NASG in the facility, and the lack of non-pneumatic anti-shock garments have a positive association. Conclusion and Recommendation: There was a lower rate of NASG utilization (39.3%) among healthcare professionals for the management of obstetric hemorrhage. Training and increasing the availability of NASG are important.

**Keywords:** Utilization, Non-pneumatic Anti-shock Garment, Obstetric Hemorrhage, Maternal Morbidity

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## 1. Introduction

### 1.1. Background

The (NASG) is a unique life-saving first-aid package for women with obstetric hemorrhage made of neoprene and Velcro. Non-pneumatic anti-shock garments serve a unique purpose in preventing hemorrhage and controlling shock [1].

Non-Pneumatic Anti-Shock Garment (NASG) is a one-of-a-kind, life-saving first-aid device composed of neoprene and Velcro for women with obstetric hemorrhage. It can be used by anyone, including individuals with no medical background. Because it is designed to be utilized alongside other technologies, the non-pneumatic anti-shock garment plays a unique role in bleeding and shock control. It is currently the only tool that can help stabilize a woman's pulse

and blood pressure after she has experienced shock due to obstetric hemorrhage. Non-pneumatic anti-shock garments can reverse shock and can be used in conjunction with other hemorrhage and shock treatments such as uterine massage, uterotonics, blood transfusions, vaginal procedures and surgery, and uterine balloon tamponing [2, 3].

The (NASG) is a neoprene and Velcro first-aid compression kit worn over a washable and reusable foam compression ball. The Life Wrap NASG offers adequate circumferential counter-pressure to the heart, brain, and lungs to minimize blood loss and reverse shock by increasing blood pressure in the heart, brain, and lungs. As a result, obstetric hemorrhage-induced hypovolemic shock can be reversed. Thus, hypovolemic shock caused by obstetric hemorrhage may be reversed. The NASG is a life-saving device that should be available to all pregnant women worldwide, particularly in low-resource countries [2].

Obstetric hemorrhage (OH) is the leading cause of maternal death worldwide, accounting for more than a quarter of all maternal deaths per year. Skilled birth attendants and all-encompassing emergency obstetric care technologies can effectively prevent many of these deaths [2, 4]. Among developed and developing countries, the percentage of maternal deaths caused by PPH varies significantly [5]. The NASG is washable, a lightweight neoprene suit with three parts on each leg, one over the pelvis, and another over the abdomen, as well as a foam compression ball. The NASG has a special function in reversing shock, preserving vital signs, and keeping the heart, lungs, and brains oxygenated. It may be used in combination with other maternal hemorrhage treatments [6].

The (NASG) is a first-aid kit intended to support women suffering from obstetric hemorrhage and shock [7].

The Global Library of Women's Medicine (GLOWM), International Federation of Gynecology and Obstetrics (FIGO), and the World Health Organization recommend the use NASG [8]. NASG is resuscitation and first-aid device that can aid in the prevention of bleeding. Stabilizing women with hypovolemic shock due to obstetric hemorrhage is important and can be used to treat obstetric hemorrhage in all stages, including antepartum, intrapartum, and postpartum hemorrhage [9].

The NASG is a resuscitation and first-aid kit that can assist with bleeding control. It can be used to treat obstetric hemorrhage in all stages, including antepartum, intrapartum, and postpartum hemorrhage. The evidence suggests that NASG is important to keep women healthy when undergoing blood transfusions and surgeries at specialist referral facilities, as well as to manage hemorrhage during delays and tertiary-level facilities that use a non-pneumatic anti-shock garment for postpartum hemorrhage treatment minimizes maternal mortality by 48% at referral facilities [10].

Postpartum hemorrhage (PPH) is a global public health issue that is the leading cause of maternal deaths. Women with PPH in developed countries often present with serious conditions, and care may be inadequate to save their lives. The use of a non-pneumatic anti-shock garment (NASG) has been shown in a few studies to increase maternal survival [11]. The non-pneumatic anti-shock garment should be worn

until the patient's vital signs have stabilized for at least 2 h, which includes blood loss of less than 50 mL/h, a pulse of less than 100 bpm, and a systolic blood pressure of more than 100 mmHg. The removal of NASG begins at the bottom and works its way up, with 15 min between each removal to allow for blood redistribution. But if her hemodynamic status has not become unstable use the "Rule of 20", which means her pulse has not increased by more than 20 bpm and her systolic blood pressure has not decreased by more than 20mmHg. If the pulse and blood pressure remain stable, the next segment pair is opened [12, 13].

## 1.2. General Objective

To assess the Utilization of non-pneumatic anti-shock garments and Associated factors among health care professionals in public hospitals in Addis Ababa, Ethiopia in 2021.

## 1.3. Specific Objective

- 1) To determine Ever use history by health care providers of Non-Pneumatic Antis Shock Garment among health care professionals at public hospitals, Addis Ababa, Ethiopia, 2021.
- 2) To identify factors associated with the utilization of non-pneumatic anti-shock garments among health care professionals at public hospitals, Addis Ababa, Ethiopia, 2021.

# 2. Methods and Materials

## 2.1. Study Area and Period

This research was conducted in Ethiopia's capital city of Addis Ababa's public hospitals. The city has a population density of 5,535.8 inhabitants per square kilometer and occupies an estimated area of 174.4 square kilometers. According to estimates from Ethiopia's Central Statistical Agency, the Addis Ababa Region's total population is estimated to be 3.55 million. Females in the reproductive age group accounted for 35.5 percent of the overall population. There are ten sub-cities and 116 woreda in the region. A total of [10] public hospitals, Six hospitals were operated by the Addis Ababa Health Bureau and four by the Federal Ministry of Health (1). The study was conducted from March 31 to April 15/2021.

## 2.2. Study Design

An Institutional based cross-sectional study was conducted.

## 2.3. Inclusion and Exclusion Criteria

### 2.3.1. Inclusion Criteria

Healthcare professionals registered in the human resources of the Hospitals who have been working in the maternity and labor ward and have worked for more than six months.

### 2.3.2. Exclusion Criteria

Healthcare professionals registered in the human resources of the Hospitals who have been working in the maternity and labor ward for six months and above.

## 2.4. Sample Size and Sampling Technique

### 2.4.1. Sample Size

The required sample size of the study was determined using a single population proportion formula as follows.

$$n = \frac{(Z_{\alpha/2})^2 \times p(1-p)}{d^2}$$

Where n is the required sample size

$Z_{\alpha/2}$  is the standardized normal distribution value at the 95% confidence interval level, which is 1.96.

p is the proportion of those with good utilization. considering assumptions and a previous study in Mekele university which was (64.2%) 95% CI=58.84–69.32% (2).

d is the margin of error, which is set to 5%.

Non-Response rate 10%

$$n = \frac{(1.96)^2 \times 0.642(1-0.642)}{(0.05)^2}$$

$$n = \frac{3.8416 \times 0.229}{0.0025}$$

$$n = 353$$

After adding non 10% response rate total sample size become 388.

### 2.4.2. Sampling Technique

Ten public hospitals in Addis Ababa were included in this study. Then, based on the total number of maternity and labor ward health care professionals in each hospital, the total sample size of 388 randomly selected healthcare professionals was proportionally allocated to each hospital, as shown in figure two below. Finally, representative samples are drawn using a simple random sampling technique using the lottery method which involves combining the payroll lists of employees as the sampling frame for each hospital.

## 2.5. Data Collection Instrument

The adapted questionnaire was generated based on the socio-demographic variables of the utilization of NASG utilization [1, 3]. It was prepared in the English version and the questionnaire contains four parts which include with socio-demographic status seven questions, knowledge of Non-pneumatic anti-shock garment Ten questions, attitude of health care professionals regarding Non-pneumatic anti-shock garment eight questions, Utilization of pneumatic anti-shock garment sixteen questions and attitude statement consisting of five Likert scales that were strongly agreed, agree, neutral, disagree and strongly disagree. The data was collected in a well-organized manner, with a self-descriptive questionnaire prepared to preserve the data's accuracy and increase the precision of the findings. 5% of the sample population was evaluated to determine the questionnaire's appropriateness, completeness, accuracy, and

ease of understanding. Pre-tested samples, on the other hand, were not included in the sample population.

## 2.6. Data Processing and Analysis

The data were cleaned and manually coded to ensure completeness and consistency. Then it was entered into epi data version 3 and exported to SPSS version 25 for further analysis. Descriptive statistics were performed and are presented in the tables and graphs. Logistic regression was used to identify factors associated with NASG Utilization. Variables were first analyzed with Bivariate ( $p < 0.2$ ) and then multivariate logic regression model and considered statistically significant at a P-value of  $< 0.05$ . The adjusted odds ratio with a 95% CI interval was used to determine the degree and direction of the association between covariates and the outcome variable.

## 2.7. Data Quality Control

The Data collectors were provided instructions before data collection. Data collectors were provided with one day training on data collection. Six diploma/BSC health care staff were involved in the data collection; with a supervisor checking the completeness, accuracy, and appropriateness of the data collected every day. A pre-test of the questionnaire was performed on 5% of healthcare staff in Bishoftu hospital. Data were obtained after each health care professional provided informed consent. Codes were used to preserve confidentiality, and no names of respondents were used in any of the data collection instruments.

## 2.8. Ethical Consideration

The KMU Menlik II Medical and Health Science College ethics review committee and the Addis Ababa Health Bureau Public Health Research and Emergency Management ethics review committee were consulted for institutional ethical clearance approval. Ethical clearance was obtained from the Addis Ababa public health research and Emergence management Director. In addition, the Addis Ababa regional health Bureau issued a letter of approval and cooperation, which was submitted to each public hospital chosen. Data collectors first notify each respondent about the study's intent, potential benefits, and lack of risk associated with engaging in research processes by filling out questionnaires, as well as the confidentiality of their responses and personality details. Informed consent was obtained from the study purpose and procedures, potential risks and benefits, voluntary participation, and right of withdrawal, and the information provided by each respondent was kept strictly confidential.

# 3. Results

## 3.1. Socio-demographic Characteristics of Health Care Professionals, Who Were Working in Public Hospitals Addis Ababa, Ethiopia, 2021

A total of 377 health care professionals participated in the study, with a response rate of (97.1%). Among participants

majority of age group 26 to 35 193 (51.2%), >35 years 39 (10.3%). Most respondents were 197 women (52.3%) and 180 men (47.7%). Professional 321 (85.1%) Were midwives and obstetricians, and 11 (2.9%) Service years. Total of 154 (40.8%) had 1-2 years of work experience, and 32 (8.1%) had >11 years of work experience. Current Working room 148 (39.3%) were

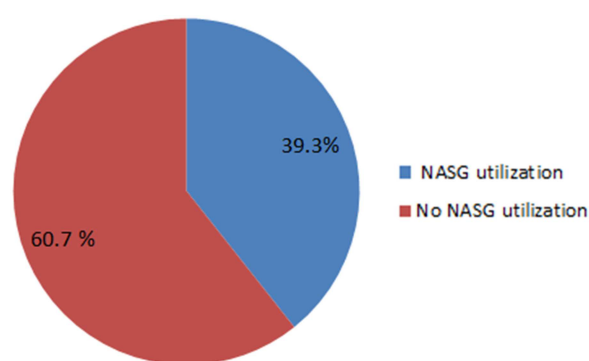
working deliveries and 7 (1.9%) were working postnatal wards. Qualification 349 (92.6%) was Degree and 7 (1.9%) was Msc A total of 194 (51.5%) respondents were working in General hospitals, and 183 (48.5%) respondents were working in specialized Hospital (Table 1).

**Table 1.** Socio-Demographic and work-related characteristics of health care professionals in, public hospitals, Addis Ababa, Ethiopia, 2021 (N=377).

	Variable	Frequency	Percentage
Age	20-25	145	38.5
	26-35	193	51.2
	>35	39	10.3
Sex	Male	180	47.7
	Female	197	52.3
profession	Midwife	311	82
	Nurse	44	12
	GP	15	4.0
	Obstetrician	7	2
	1-2 year	154	41
Service year	3-6 year	150	40
	7-11 year	41	11
	>11 year	32	8
Current Working Room	Delivery Room	148	39
	Emergency Delivery Room	51	14
	Delivery Operation Room	45	12
	Postnatal ward	7	2
	Maternity ward	126	33
Qualification	Diploma	18	5
	Degree	345	91
	MSc	7	2
Level of facility	Specialist Doctor	7	2
	General Referral Hospital	194	51.5
	Specialized Hospital	183	48.5

### 3.2. Non-pneumatic Anti-shock Garment (NASG) Utilization

Utilization of non-pneumatic anti-shock garments concerning the utilization of non-pneumatic anti-shock garments by health professionals, was 148 (39.3%) using NASG for postpartum hemorrhage management while 229 (60.7%) never applied it for postpartum hemorrhage complication management. The reasons reported by respondents who did not use non-pneumatic anti-shock garments, (42.4%), were due to lacked experience, (89.4%) were due lack of training and (48%) were due to the availability of non-pneumatic anti-shock garments in the hospital (Table 2).



**Figure 1.** Overall utilization of NASG towards health care professionals in public hospitals, Addis Ababa, Ethiopia, 2021, (N=377).

**Table 2.** Utilization of NASG towards health care professionals in public hospitals, Addis Ababa, Ethiopia, 2021, (N=377).

Variable		Number	Percent
Do you know how to use the NASG	Yes	199	52.8
	No	178	47.2
Have you ever used NASG	Yes	148	39.3
	No	229	60.7
NASG is part of your health care protocol	Yes	201	53.3
	No	77	20.4
	I do not know	99	26.3
If yes was it effective	Yes	148	39.3
	Never use	229	60.7
Do you use NASG every time if there is PPH	Yes	16	4.2
	No	262	69.5

Variable		Number	Percent
If no when do you use it	Never use	99	26.3
	Sever PPH shock	106	28.1
	When another method fails	99	26.3
	Never use	167	44.3
Do you use it when the need Arises in your hospital	I have used it when the arises	5	1.3
	Yes	152	40.3
	No	225	59.7
	It is difficult to assemble	9	2
If no why	It is not available	115	31
	I do not know much about how to use it	105	28
	I have used it when the arises	148	39
	1-2_times	71	18.8
How long the Anti-shock garment has been Used in a years	2-4 times	30	8.0
	> 5 times	47	12.5
	Never use	229	60.7
	Yes	351	93.1
If you know how to use it will you use it	No	26	6.9
	Yes	196	52
The NASG is available in your hospital	No	181	48
	Zero	181	48
	One	127	33.7
	Two	69	18.3
Do you have been trained on NASG	Yes	40	10.3
	No	337	89.4
Do use NASG in the previous Work	Yes	68	18.0
	No	309	82.0
What is the reason for non-utilization	Availability of other methods	102	27.1
	Lack of experience	160	42.4
	Not aware Existence of NASG in the facility	115	30.5
	Yes	377	100
Do you have availability of other Method to treat OH	NASG utilization	148	39.3
	No NASG utilization	229	60.7

### 3.3. Reasons for not Using the Non-pneumatic Anti-shock Garment

According to this assessment out of 377 respondents the main factors that were reported by the respondents as influencing against effective use of NASG was lack of Training (89.7%) lack of Experience (42.4%), followed by the availability of NASG (48%).

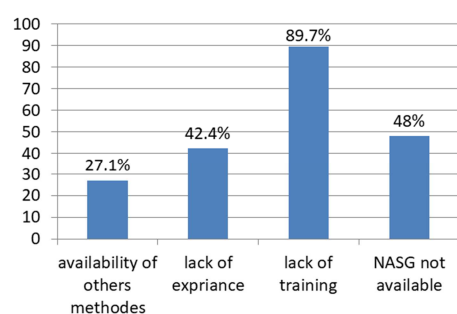


Figure 2. Health care professional's reason to not utilize NASG at Public hospitals in Addis Ababa, Ethiopia, May 2021.

### 3.4. Respondents' Knowledge of Non-pneumatic Anti-shock Garment

This study indicated that all 377 (100%) respondents had heard about non-pneumatic anti-shock garments before. About 296 (78.5%) of the respondents had seen NASG and 81 (21.5%) had not seen NASG before. Regarding the function of

Non-pneumatic anti-shock garments, 231 (61.3%) Majority of respondents mentioned that non-pneumatic anti-shock garments compress blood vessels and increase blood flow to vital organs. Regarding the criteria for the application of non-pneumatic anti-shock garment for women with postpartum hemorrhage about 229 (60.7%) responded that NASG was applied when Systolic blood pressure was <90mmhg and pulse >110bpm. About 192 (50.9%) of the respondents heard from the hospital (50.9%). One hundred thirty-Four (35.5%) of the respondents heard from the school, 12 (2.9%) heard from the seminar and 39 (10.3%) heard from Training. About 218 (57.8%) were responding that non-pneumatic anti-shock garment looks like trousers and 52 (13.8%) respond that NASG looks like Gown. About 173 (45.9%) of the respondents correctly mentioned that non-pneumatic anti-shock garment has six parts and 73 (19.4) were respond that NASG has four parts. About 286 (75.9%) respondents had good knowledge of non-pneumatic anti-shock garments, (Table 3).

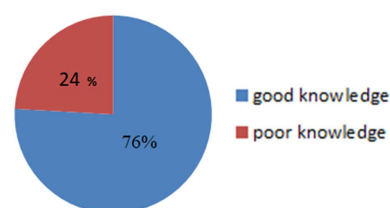


Figure 3. Overall knowledge of NASG towards health care professionals in public hospitals, Addis Ababa, Ethiopia, 2021, (N=377).

**Table 3.** Knowledge of NASG health care professionals in public hospitals, Addis Ababa, Ethiopia, 2021, (N=377).

Variable		Number	Percent
Have you heard of NASG	Yes	377	100
Have you ever seen the NASG	Yes	296	78
	No	81	22
What is the function of NASG	Prevent any type of shock	47	12.5
	stabilize the women in septic shock	66	17.5
	compress blood vessels and increase blood flow to vital organs	231	61
	No response	33	9
Do you know proper use Of NASG Number	Yes	203	54
	No	174	46
What NASG Look like	like Gown	52	14
	Trousers	218	58
	The bottom half of the suit	72	19
	I do not know	35	9
Where did you hear NASG	Hospital	192	51
	School	134	36
	Seminar	11	3
	Training	40	10
	Four	73	19
How many parts have the NASG	Eight	82	22
	Six	173	46
	I don't know	49	13.0
What is a contraindication to use of NASG	Viable fetus	245	65.0
	Uterine massage after placenta delivery	53	14
	Bleeding above the level of Diaphragm	13	3
	Pulmonary edama	41	11
	I don't know	25	7
NASG Applied for women with PPH When	Vaginal bleeding <300ml	106	28
	Systolic blood pressure<90mmhg and pulse >110bpm	229	61
	pulse<110 bpm	27	7
	No response	15	4.0
NASG removed when	Blood loss>500ml/hr.	110	29.2
	Pulse<100bpm_and_systolic blood pressure >100mmhg	224	59.4
	If the patient is unstable	28	7.4
	No response	15	4.0
Overall Knowledge	Good Knowledge	286	75.9
	poor knowledge	91	24.1

### 3.5. Respondents' Attitude Towards Non-pneumatic Anti-shock Garment

Attitudes of health care professionals towards utilization of non-pneumatic anti-shock garment Regarding the attitudes of the respondents towards utilization of NASG for the management of postpartum hemorrhage, about 372 (98.7%) of the respondents agreed that NASG is necessary for the management of postpartum hemorrhage in all settings and

(1.3)% disagree. About (96%) respondents agreed that NASG can be used along with standard treatment protocols of postpartum hemorrhage management and about 15 (4%) disagreed. Concerning the time required to apply NASG about (95%) were agree that NASG can be applied with minimum Procedures in a short period and about (5%) were disagreed. Regarding the attitudes of respondents towards non-pneumatic anti-shock garment, utilization was (92.6%) had a favorable attitude and (7.4%) were unfavorable attitude (Table 4).

**Table 4.** Attitude of NASG towards health care professionals in public hospitals, Addis Ababa, Ethiopia, 2021, (N=377).

Variable		Number	Percent
The use of a non-pneumatic anti-shock garment is necessary for the management of Postpartum haemorrhage in all settings	strongly Agree	112	29.7
	Agree	260	69.0
	strongly Disagree	3	0.8
	disagree	2	0.5
NASG used along with standard treatment protocols of postpartum haemorrhage	strongly Agree	105	28
	Agree	257	68
	strongly Disagree	3	0.8
	disagree	12	3.2
NASG can be applied with minimum procedures in a short period	strongly Agree	102	27.1
	Agree	257	68.2
	strongly Disagree	8	2
	disagree	10	2.7

Variable		Number	Percent
Removal of NASG requires a lot of procedures that takes time	strongly Agree	9	2.4
	Agree	18	4.8
	Neutral	9	2.4
	strongly Disagree	172	45.2
	disagree	169	44.8
Non-pneumatic Anti-shock garment is only beneficial to people in the rural areas /primary care setting	strongly Agree	2	0.5
	Agree	10	2.7
	Neutral	2	0.5
	strongly Disagree	167	44.3
	disagree	196	52.0
Manual removal of the placenta is possible with NASG in place	strongly Agree	65	17.2
	Agree	263	69.8
	Neutral	5	1.3
	strongly Disagree	20	5.3
	disagree	24	6.4
Non-pneumatic Anti-shock garment is effective in patients with cervical lacerations	strongly Agree	90	23.9
	agree	261	69.2
	Neutral	4	1
	strongly Disagree	9	2.4
	disagree	13	3.4
The garment should be a must in every health a care facility that has maternity service	strongly Agree	99	26
	agree	258	68.4
	strongly Disagree	6	1.6
	disagree	14	4
overall attitude	favourable attitude	349	92.6
	unfavourable attitude	28	7.4

### 3.6. Factors Associated with Non-Pneumatic Anti-shock Garment Utilization by Health Care Professionals

In this study Binary logistic analysis on utilization of Non-Pneumatic Anti-shock Garment (NASG) and factor affecting Utilization of NASG in 95% CI. there was an association between sex (female) and utilization of Non-Pneumatic Anti-shock Garment p-value 0.015, qualification (GP) and Utilization of Non-Pneumatic Anti-shock Garment P-value 0.010, level of health facility (General Hospital) and utilization of Non-Pneumatic Anti-shock Garment P-value 0.007, Non-Pneumatic Anti-shock Garment Availability and utilization of Non-Pneumatic Anti-shock Garment P-value 0.001, Not Trained and utilization of Non-Pneumatic Anti-shock Garment P-value 0.027 and also not aware existence of NASG and utilization of Non-Pneumatic Anti-shock Garment P-value 0.001. But there is no association between Age and utilization of NASG, service year and Utilization of Non-Pneumatic Anti-shock Garment, current working room, and

Utilization of Non-Pneumatic Anti-shock Garment and also Knowledge, attitude and Utilization of Non-Pneumatic Anti-shock Garment there was no association between Utilization of Non-Pneumatic Anti-shock Garment.

Multivariable analysis Utilization of Non-Pneumatic Anti-shock Garment has significantly associated Study participants of sex (female) were 2.6 times more likely Utilized than Male (AOR=2.6, CI=1.198-5.502), profession (General Practitioner) 88% less likely Utilized than midwives (AOR=0.122, CI=0.025-0.705), Level of the facility (General hospital) 71% less likely Utilized than specialized Hospital. (AOR=0.291, CI=3.119-7.110), Availability of NASG 4.7 time more likely Utilized than those have No NASG in the facility. AOR=4.719, CI=2.170-10.265), have Trained on NASG was 5.5 Times more likely Utilized than those who have no Training on NASG. AOR=5.469, CI=1.08-24.757), Not aware Existence of NASG in the Facility was 99% less likely Utilized than their counterpart. (AOR=0.010, CI=0.003-0.036) (Table 5).

**Table 5.** Unadjusted and Adjusted Analysis of Factors Associated with Non-Utilization of NASG among the Health care Professionals Working at Public hospitals in Addis Ababa, Ethiopia, May 2021.

Variable		Utilization of NASG		COR (95%CI)	AOR (95%CI)	P-value
		Good utilization (n)	Poor utilization (n)			
Age	20-25	65	80	1	1	
	26-35	68	125	1.494 (.961-2.321)	.961 (.278-3.323)	
	>35	15	24	1.300 (.631-2.680)	1.077 (.353-3.286)	
Sex	Male	62	118	1	1	
	Female	86	111	1.475 (.972-2.237)	2.568 (1.198-5.502)	.015*
	Midwifery	127	180	1	1	
Profession	Nurse	6	38	4.549 (1.868-11.077)	2.054 (.448-9.403)	
	GP	8	7	.628 (.222-1.776)	.122 (.025-.705)	.010*
	Obstaterian	7	4	.539 (.119-2.448)	.197 (.010-4.09)	

Variable		Utilization of NASG		COR (95%CI)	AOR (95%CI)	P-value
		Good utilization (n)	Poor utilization (n)			
Service year	1-2 Year	66	88	1	1	
	3-6 Year	58	92	.912 (.421-1.979)	1.823 (.468-7.100)	
	7-11 Year	11	30	1.085 (.498-2.363)	1.967 (.513-7.543)	
	>11	13	19	1.866 (.695-5.009)	1.977 (.396-9.881)	
Current work place	Delivery Room	57	91	1	1	
	Emergency Delivery Room	24	27	.716 (.433-1.183)	.722 (.286-1.822)	
	Delivery operation room	23	22	.504 (.259-.983)	.932 (.244-3.556)	
	Post Natal Room	5	2	.429 (.214-.860)	1.375 (.393-4.806)	
	Maternity room	39	87	.179 (.033-.965)	.178 (.010-3.216)	
Qualification	Diploma	2	16	1	1	
	Degree	136	205	.185 (.042-.818)	.203 (.026-2.055)	
	MSc	3	4	.167 (.020-1.358)	.052 (.003-1.056)	
	Specialist	7	4	.094 (.012-.764)	.084 (.005-1.356)	
Level of health facility	General	53	141	2.872 (1.871-4.409)	.291 (.119-.710)	.007*
	Specialized	95	88	1	1	
Knowledge	Good	137	149	.150 (.076-.233)	1.353 (.526-3.482)	
	Poor	11	80	1	1	
Attitude	favourable	142	207	1	1	
	unfavourable attitude	6	22	.398 (.157-1.005)	.684 (.162-2.893)	
NASG is availability	Yes	107	58	9.828 (5.926-16.300)	4.719 (2.170-10.265)	.001*
	No	41	171	1	1	
Do you Have been trained on the use of anti-shock garment	Yes	10	29	2.001 (.944-4.239)	5.469 (1.08-24.757)	.027*
	No	138	200	1	1	
What is the Reason for non-utilization	Availability of other methods	24	74	1	1	
	Lack of experience	18	142	38.278 (16.859-86.909)	1.240 (.499-3.084)	
	Not aware existence of NASG	106	9	92.914 (40.161-214.957)	.010 (.003-.036)	

Statically significant at p-value <0.05

## 4. Discussion

This study focused on health care professional's use of non-pneumatic anti-shock garments and related factors among health care professionals in public hospitals in Addis Ababa, Ethiopia in 2021. The study participants were selected from all public hospitals.

This study revealed that there were (39.3%) CI=34.3%-44.4%). Health care professionals who were utilizing NASG for the management of obstetric hemorrhage. This result was less than the study conducted in Nigeria (46.4%) in 2015 (3).

The utilization of NASG in this study was lower compared to a study conducted in Mekele which reported most nurses and midwives used NASG in the management of obstetric hemorrhage 64.2% (2). This difference may be due to the difference in training, supervision, administration, and availability of NASG. When comparing health care professionals who received training in non-pneumatic anti-shock garments to those who did not, this study found that those who received training used the non-pneumatic anti-shock garment more effectively. non-pneumatic anti-shock training made health workers thirteen times more likely to utilize it than those who did not. This could be because attending training can help health care providers gain more understanding about how to apply and remove non-pneumatic anti-shock garments, allowing them to better utilize them.

And also this study's result was higher than the study conducted in Jima (36.2%) [10]. This difference may be

due to the difference in urbanization, study methodology, sample size, and the difference in availability of NASG in the facility. This study result was greater than the study done in Nigeria hospitals in Ogun state, Which was (22.7%) (4). The result was greater when compared to the study done in Hospitals in Ondo-State, Nigeria in 2017 (14.1%) [1].

Another factor that was statically linked with the use of non-pneumatic anti-shock garments by health care workers in this study was the availability of non-pneumatic anti-shock garments. Those who have non-pneumatic anti-shock garments in the facility are more likely used than those who have no non-pneumatic anti-shock garment in the facility. The lack of availability of the garment at the facility level was the most often reported factor preventing the usage of the garment by the health care professionals who took part in the study.

Generally, these differences might be attributed to the study setting or study designs. The other reason for the variation of NASG utilization might be due to country-to-country differences in scaling up and awareness creation among the healthcare professionals. Increasing the utilization and coverage of the NASG requires the involvement of local NASG champions, greater NASG awareness among policymakers and clinicians, as well as a strong advocacy and political will, which all have a significant impact on NASG utilization among the healthcare professionals working in maternity services.



## 5. Conclusion and Recommendation

There was a lower rate of NASG utilization (39.3) with good knowledge among the healthcare professionals for the management of obstetric hemorrhage. Being a female care professional, not the availability of NASG to manage PPH, and lack of training on the garment in the facility, and not being aware of the existence of non-pneumatic anti-shock garments in the facility were significantly associated factors for the non-utilization of the NASG. Due emphasis should be given to the utilization of NASG to manage obstetric hemorrhage by addressing the identified modifiable factors for non-utilization of NASG by healthcare professionals.

### 5.1. To Federal Ministry of Health and Addis Ababa Regional Health Bureau

- 1) Adequate training to each public hospital obstetric and maternity ward health care professionals.
- 2) Should make the Non-Pneumatic Anti-shock garment (NASG) available in all public hospitals in Addis Ababa Ethiopia.
- 3) Should be given the highest priority by every hospital administrator and supervise as standard protocol.

### 5.2. To Sub-city Health Office

monitoring and supervision of obstetric and maternity ward staff to ensure appropriate utilization of the non-pneumatic anti-shock garment Should be given the highest priority by every hospital administrator.

### 5.3. To all Addis Ababa Public Hospitals

- 1) The hospital administrators and leaders should motivate and appreciate those labor and maternity health care professionals who use NASG when the need arises.
- 2) As survival of the patient is the utmost goal of any health facility, the Management of all Addis Ababa public hospitals should ensure that NASG is adequately made available in the sub-wards of the maternity unit.

### 5.4. To Obstetric and Maternity Health Care Professionals

Every laboring mother should be at risk of obstetric hemorrhage appropriate utilization of NASG according to WHO criteria at the right time which needs a great commitment.

## Abbreviations and Acronyms

CHAI	Clinton Health Access Initiative
EDHS	Ethiopian demographic and health survey
EAOS	extreme adverse outcomes
FIGO	Federation of Gynecology and Obstetrics
GLOW	Global Library of Women's Medicine
KMU	Kotebe Metropolitaline university
MMR	Maternal Mortality Ratio

MDGs	Millennium development goal
NASG	Non-pneumatic Anti-shock Garment
OH	Obstetric hemorrhage
PPH	Post-partum hemorrhage
WHO	World Health Organization

## Ethical Approval and Consent to Participate

Ethical approval was obtained from the Research Ethics committee of Menlik II Medical and Health Science College, Kotebe metropolitan university. Permission was also obtained from Addis Ababa Health Bureau Public Health Research and Emergency Management Directorate. And also Informed consent was obtained from each study participant after a clear explanation about the benefit and harm of the study.

## Authors' Contributions

All authors made a significant contribution to the work reported, whether that is in the conceptions, study design, acquisition of data, analysis, and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspect of the work.

## Declaration of Conflicts of Interest

All the authors do not have any possible conflicts of interest.

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