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EFFECTIVENESS OF THE USABILITY OF SMART PHONE AND SKILL TRAINING ON KNOWLEDGE REGARDING ANTENATAL HEALTH SERVICES AMONG ASHA WORKERS

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ABSTRACT

Accredited social health activist (ASHA) workers serve as a vital link between rural communities and healthcare services, playing a central role in achieving national health and population objectives. Enhancing their antenatal health service knowledge is crucial for reducing maternal mortality rates. To address this, a Randomized Control Trial involved 88 ASHA workers conducted, evaluating the impact of smart phone usability and skill training. The control group demonstrated an average smart phone usability score of 23.15 (SD: 3.354), whereas the experimental group exhibited 15.9% with "Fair" usability (scores 11-20) and 84.1% with "Good" usability (scores 21-30). Knowledge scores increased significantly from an undisclosed pre-training average to 27.22 (SD: 2.963) post-training. These findings emphasize the substantial improvement in ASHA workers' antenatal health service knowledge due to skill training and enhanced smart phone usability, which could potentially contribute to reducing maternal mortality. The study concludes that ASHA workers possess good antenatal care knowledge, and refresher training in this area is highly beneficial. Additionally, regular and widespread monitoring of ASHA workers' activities is essential to ensure the quality of services provided to beneficiaries, thereby enhancing their overall performance.

Keywords: Effectiveness, Knowledge, Health workers, Smartphone usage, Antenatal Services, ASHA

INTRODUCTION:

The Government of India launched the National Rural Health Mission (NRHM) on 12th April 2005 **[1]**, in order to provide accessible, accountable, affordable, effective and reliable primary health care, especially to the poor and vulnerable sections of the population. One of the key components of national rural health mission is to provide every village with a trained female community health activist called Accredited Social Health Activist (ASHA) who acts as interface between community and public health system **[2]**. She is the first port of call for any health-related demands of deprived sections of the population **[3]**.

ASHA is the one who is identified in the rural area for per 1000 population with the purpose of supporting the community to access public health services **[4]**. She is expected to ensure the antenatal, natal and postnatal services to women[5]. Counselling on family planning and nutrition, safe abortion, escort or accompany the pregnant female to hospital for institutional delivery, to create awareness on institutional delivery, potential danger signs and complications during pregnancy, delivery and postpartum period and to mobilize the community toward increase utilization of the existing health services **[6]**. The Ministry of Health & Family Welfare (MOHFW) has developed a 23-day basic training schedule to provide the necessary knowledge and skills to women identified as ASHA and there is also regular re-orientation trainings organized at the district levels. Separate curriculum and the modules are made available in providing training to the ASHAs **[1, 7]**.

Ante Natal Care (ANC) is the care a woman receives throughout her pregnancy in order to ensure that both, the mother and child remain healthy **[1, 8]**. Basic components of ANC include to ensure early registration and see to it that the first check-up is conducted within 12 weeks (first three months of pregnancy) **[11]**, track every pregnancy for conducting at least four antenatal check-ups (including the first visit for registration), administer two doses of TT injection[12] and provide at least 100 tablets of Iron and Folic acid **[1-13]**.

Antenatal care (ANC) is a widely used strategy to improve the health of pregnant women and to encourage skilled care during childbirth **[14]**. Maternal mortality, the death of a woman while pregnant or within 42 days of termination of pregnancy, remains disturbingly high **[9]**. Maternal mortality occurs from risks attributable to pregnancy and child birth as well as from poor availability and quality of health services **[15]**. New estimates show that the leading causes of maternal deaths are haemorrhage and hypertension, which together account for more than half of

maternal deaths. Indirect causes, which include deaths due to conditions such as malaria, HIV/AIDS and cardiac diseases, account for about one fifth of maternal deaths. Regional estimates show that haemorrhage and hypertension are among the top three causes of deaths in both South Asia and Sub-Saharan Africa **[10]**.

A study was carried out in Karnataka state, with the objectives to assess their performance against their job descriptions, ASHAs were predominantly (>80%) involved in certain tasks: home-visits, antenatal counselling, delivery escort services, breastfeeding advice, and immunization advice. Performance was moderate (40-60%) for: drug provision for tuberculosis, caring of children with diarrhoea or pneumonia, and organizing village meetings for health action. Performance was low (<25%) for advice on: contraceptive-use, obstetric danger sign assessment, and neonatal care. It concluded that the ASHA workers were functional in some areas were perceived to be more of a link-worker/facilitator rather than a community health worker or a social activist **[19]**.

Globally, about 800 women die every day of preventable causes related to pregnancy and childbirth; 20 per cent of these women are from India. Annually, it is estimated that 44,000 women die due to preventable pregnancy-related causes in India. Mothers in the lowest economic bracket have about a two and a half times higher mortality rate. UNICEF India supports capacity-building and on-the-job coaching (supportive supervision) for improved maternal health. In 2013 and 2014, in addition to supporting courses for skilled birth attendants, UNICEF supported the MOHFW to pioneer a short-term training on maternal health using models and dummies **[20]**.

Keeping the above facts and the literature review the investigators felt the need to provide skill training on antenatal care for the ASHA workers. So that the ASHA workers can provide skilled care to the mothers in need as well, as reduce the maternal mortality rate in her respective area.

MATERIALS AND METHODS:

A randomized control trial study was conducted among 88 ASHA workers in Bangalore district, Karnataka-2022.From the selected district a total of 12 health centre (six from urban and six from rural) will be selected randomly and from each urban and rural health centre three centres had been equally assigned into intervention and control group. The ASHA workers who fulfil the selection criteria were recruited for the study by using simple random sampling technique.

The investigators based on the resources available from the literature and health

workers training modules had created the content of the skill training material. The member of the research team has conducted the training in six (06) sessions over two days. The duration of each session will be 45-60 minutes and two to three sessions per day. The session was included with both theory and skill training. The theme that had been addressed during the training session are such as Activities related to health promotion, Physical examination, Identification of warning science during pregnancy, Skill training on urinalysis, Management of anaemia complication, haemoglobin estimation using Dr.Tallquist paper and interpretation and Guidance and counselling on birth preparedness.

Prior to the skill training the ASHA workers were assessed for usability of smart phone for providing antenatal health services using four-point Likert rating scale. Self-Structured knowledge questionnaire were used to assess the knowledge on Antenatal health services among ASHA workers. The duration to complete the pre-training test was 30-45 mins. Post training test knowledge was assessed after a session and after a month of the intervention for experimental group and control group. For experimental group there were training sessions for a two days whereas no training sessions were conducted for control group and pre-test and post-tests were conducted with similar intervals for both experimental and control group. The collected data were recorded and entered in the excel master sheet, SPSS software (version20) was used for data analysis. The effectiveness of the skill training on antenatal health services for health workers was evaluated using a paired t- test.

RESULTS:

A comprehensive interview was conducted with a total of 88 ASHA workers to explore the effectiveness of the usability of smart phone and skill training on knowledge regarding Antenatal health services. The details of the participants' socio-demographic variables are presented in **Table 1**.

Table 1 indicates that participants aged 29-34 years represent the highest frequency in both experimental and control groups (38.6%). Both groups comprise 100% female participants. Majority of participants are Hindu, with 70.5% in the experimental group and 79.5% in the control group. Secondary school education is prevalent, with 81.8% in experimental and 72.7% in control groups. The majority are married (84.1% in experimental, 93.2% in control). "General" category dominates caste distribution in both groups (81.8% each). In the experimental group, "Nuclear" families are prominent (68.2%), while in control, it's 52.3%. Among experimental ASHA workers, 47.7% "Communicate well by reading and writing" in English; in contrast,

79.5% in the control group can "Only read." ASHA workers with "5-8 years" experience are prevalent (54.5% in experimental, 36.4% in control). Working "2-4 hours" per day is common (70.5% in experimental, 81.8% in control). In the control group, all use mobile phones regularly (100.0%), while in experimental, it's 86.4%. ASHA workers serving a population of ">2000" are predominant (72.7% in experimental, 45.5% in control). All participants possess smartphones (100.0% in both groups).

Table 2 illustrates a comparison of smart phone usability between the experimental and control groups. The control group displays a mean usability score of 23.15, accompanied by a standard deviation of 3.354. Among the experimental group, 15.9% of participants exhibit "Fair" usability (scores 11-20), while 84.1% manifest "Good" usability (scores 21-30). In the control group, the entire participant cohort (100%) falls within the "Good" usability range.

Table 3 tracks participants' knowledge development in the experimental and control groups across various assessment points. In the experimental group, knowledge improves from an immediate post-test mean score of 23.65 (SD: 3.964) to 27.22 (SD: 2.963) after one month. This shift is accompanied by a decline in "Moderate knowledge" from 61.3% to 27.3% and a rise in “Adequate knowledge from 38.7% to 79.6%. These results highlight substantial knowledge enhancement. Comparatively, the control group's progress is observed through different assessment stages. Immediate post-test yields a mean score of 2.06 (SD: 0.254), slightly increasing to 2.13 (SD: 0.347) after one month. "Moderate knowledge" decreases from 93.2% to 86.4% during the pre-test to subsequent post-tests, while "Adequate knowledge" increases from 6.8% to 13.6%. This suggests a moderate increase in knowledge, particularly in the "Moderate knowledge" category.

Table 4 depicts that, the means for the "Pre-test" and "Post-test-1" are both higher than 2.386, the mean of the "Pre test" knowledge level. This suggests an improvement in knowledge after the intervention (Post test-1) compared to the initial knowledge level (Pre-test). Similarly, the means for the "Pre test" and "Post test-2" are both higher than 2.386, indicating an improvement in knowledge and further shows that with standing of the knowledge for a longer duration (Post test-2). The t-test values are 4.716 and 5.456 these values are relatively high, suggesting that the differences in means are statistically significant. The p-values are both 0.000, which is less than the typical significance level of 0.05. This indicates that the differences observed are highly significant and unlikely to be due to random chance.

Table 5 Depicts that the means for the "Pre-test" and "Post-test-1" are very close (2.068 and 2.136, respectively). It suggests that a slight increase in knowledge (Post-test-1) compared to the initial knowledge level (Pre-test). Similarly, the means for the "Pre-test" and "Post-test-2" are also very close (2.068 and 2.136, respectively), indicating a similar pattern of a slight increase in knowledge (Post-test-2). The mean difference is consistently around 0.06818, suggesting a small increase in knowledge from pre-test to post-test. The t-test values are 1.774 for both sets of comparisons. This value indicates that the differences in means are not highly significant. The p-values are 0.083 for both sets of comparisons. These values are slightly above the typical significance level of 0.05, suggesting that the observed differences are not statistically significant.

Table 6 Depicts that the means and standard deviations for the "Pre-test" of both Experimental and control groups are very close (2.3864 2.0682, and 49254, 0.25497 respectively). Similarly, means and standard deviations for the "Post test-1" of both Experimental and control groups are 2.7273, 2.1364 and .45051, .34714 respectively. The means and standard deviations for the "Post test-2" of both Experimental and control groups are 2.7955. 2.1364 and .40803, .34714 respectively. The mean difference is consistently increase from pre-test to post-test-2, suggesting increase in knowledge from pre-test to post-test. The t-test values are 3.760, 7.881,and 9.118 these values is relatively high, suggesting that the differences in means are statistically significant. The p-values are 0.001 and both 0.000, which is less than the typical significance level of 0.05. This indicates that the differences observed are highly significant and unlikely to be due to random chance.

Table 7 Shows that the calculated χ^2 value was less than the table value in terms of religion, educational status, type of family, marital status, English knowledge of health workers, work experience, working hours and regular usage of mobile phones. Since no statistically significant association was found to exit between level of knowledge and selected socio-demographic variables hence the research hypothesis stated that there is statistically significant association between the level of knowledge and selected socio demographic variable was **rejected.** In case of age, caste and population served by health worker theresearch hypothesis stated that there is statistically significant association between the level of knowledge and selected socio-demographic variables was **accepted.**

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working hours and regular usage of mobile phones. Since no statistically significant association was found to exit between level of knowledge and selected socio-demographic variables hence the research hypothesis stated that there is statistically significant association between the level of knowledge and selected socio demographic variable was **rejected.** In case of caste, type of family, work experience and population served by health worker the research hypothesis stated that there is statistically significant association between the level of knowledge and selected socio-demographic variables was **accepted.**

Table 1: Frequency and percentage distribution of socio-demographic variables of ASHA workers; n=88 (Exp-44& Control-44)

Sr. No	Socio-demographic data	Experimental		Control	
		Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
1.	**Age in years**				
	a. 24-28 yrs	3	6.8	1	2.3
	b. 29-34yrs	17	38.6	17	38.6
	c. 35-39yrs	13	29.5	15	34.1
	d. 40-45yrs	10	22.7	11	25.0
	e. >46yrs	1	2.3	-	-
2.	**Gender**				
	a. Male	-	-	-	-
	b. Female	44	100	44	100
3.	**Religion**				
	a. Hindu	31	70.5	35	79.5
	b. Christian	3	6.8	1	2.3
	c. Muslims	10	22.7	8	18.2
	d. Any others	-	-	-	-
4.	**Educational status**				
	a. Middle school	-	-		
	b. Secondary school	36	81.8	32	72.7
	c. Above than Secondary school	8	18.2	12	27.3
5.	**Marital status**				
	a. Married	37	84.1	41	93.2
	b. Single	1	2.3	-	-
	c. Widowed	3	6.8	3	6.8
	d. Divorced	3	6.8	-	-
	e. Separated	37	84.1	-	-
6.	**Caste**				
	a. General	36	81.8	36	81.8
	b. Other backward class	-	-	-	-
	c. Scheduled caste	8	18.2	8	18.2
7.	**Type of family**				
	a. Nuclear	30	68.2	23	52.3
	b. Joint	14	31.8	21	47.7
8.	**English knowledge of ASHA worker**				
	a. Communicate well by reading and writing	21	47.7	9	20.5
	b. Only can able to read	23	52.3	35	79.5
	c. Do not communicate in English	-	-	-	-
9.	**Total work experience of ASHA Worker**				
	a. 1-4 yrs	18	40.9	27	61.4
	b. 5-8 yrs	24	54.5	16	36.4
	c. 9-12yrs	2	4.5	1	2.3
10.	**Working hours per day**				
	a. < 2 hrs	-	-	-	-
	b. 2-4hrs	31	70.5	36	81.8
	c. 4-6hrs	6	13.6	7	15.9
	d. >6hrs	7	15.9	1	2.3
11.	**Regular usage of mobile phones**				
	a. Yes	38	86.4	44	100.0
	b. No	6	13.6	-	-
12.	**Population served by ASHA worker**				
	a. <1000	-	-	-	-
	b. 1000-2000	12	27.3	24	54.5
	c. >2000	32	72.7	20	45.5
13.	**Possess own smart phone**				
	a. Yes	44	100.0	44	100
	b. No	-	-	-	-

Table 2: Frequency and percentage distribution of Usability of smart phone for antenatal health services among ASHA workers; n=88 (Exp-44 & Control-44)								
S. No.	Smart phone usability	Score	Experimental			Control		
			Frequency (f)	Percentage (%)	Mean &SD	Frequency (f)	Percentage (%)	Mean &SD
1.	Poor	1-10	-	-	23.15 3.354	-	-	3.00 .000
2.	Fair	11-20	07	15.9		-	-	
3.	Good	21-30	37	84.1		44	100	

Table 3: Frequency and percentage distribution of level of knowledge on Antenatal health services among ASHA workers; n=88 (Exp-44 & Control-44)																		
Sr. No	Level of Knowledge	Pre-Test						Post-Test-1						Post-Test-2					
		Exp. Group n=44			Control Group n=44			Exp Group n=44			Control Group n=44			Exp Group n=44			Control Group n=44		
		f	%	Mean & SD	f	%	Mean & SD	f	%	Mean & SD	f	%	Mean & SD	f	%	Mean & SD	f	%	Mean & SD
1.	Inadequate	-	-	23.65 3.964	-	-	2.06 0.254	-	-	27.22 2.963	-	-	2.13 0.347	-	-	28.11 2.780	-	-	2.13 0.34
2.	Moderate	27	61.3		41	93.2		12	27.3		38	86.4		9	20.4		38	86.4	
3.	Adequate	17	38.7		3	6.8		32	72.7		6	13.6		35	79.6		6	13.6	

Table 4: Effectiveness of skill training regarding antenatal health services among ASHA workers; n=44								
S. No.	Group	Level of Knowledge	Mean	SD	Mean Difference	SD Difference	t test	P valve
1.	Experimental group	Pre test	2.3864	..49254	.31818	.56126	3.760	.001
	Control group	Pre test	2.0682	.25497				
2.	Experimental group	Post test-1	2.7273	.45051	.59091	.49735	7.881	.000
	Control group	Post test-1	2.1364	.34714				
3.	Experimental group	Post test-2	2.7955	.40803	.65909	.47949	9.118	.000
	Control group	Post test-2	2.1364	.34714				

Table 5: Effectiveness of skill training regarding antenatal health services among ASHA workers; n=44								
S. No	Group	Level of Knowledge	Mean	SD	Mean Difference	SD Difference	t test	P valve
1.	Experimental group	Pre-test	2.386	.492	.34091	.47949	4.716	0.000
		Post-test-1	2.727	.450				
		Pre-test	2.386	.492	.40909	.49735	5.456	0.000
		Post-test-2	2.79	.408				

Table 6: Effectiveness of skill training regarding antenatal health services among ASHA workers in control and experimental group; n=44							
S. No.	Groups	Demographic Variables		Level of Knowledge		χ^2	P – Value
				Moderate	Adequate		
1.	Experimental Group	Age in years	24-28 years	2	1	1.336 df-4	0.855 NS
			29-34 years	10	7		
			35-39years	7	6		
			40-45years	7	3		
			>45years	1	0		
	Control Group		24-28 years	0	1	16.224 df-3	0.001 S*
			29-34 years	15	2		
			35-39years	15	0		
			40-45years	11	0		
2.	Experimental Group	Caste	General	20	16	2.817 df-1	0.093 NS
			Scheduled caste	7	1		
	Control Group		General	36	0	14.488 df-1	0.000 S*
			Scheduled caste	5	3		
3.	Experimental Group	Population served by ASHA worker	1000-2000	3	9	9.203 df-1	0.002 S*
			>2000	24	8		
	Control Group		1000-2000	22	2	0.191 df-1	0.662 NS
			>2000	19	1		

Table 7: Association between levels of knowledge with selected of socio-demographic variables -Pre-Test; n=88 (Exp-44 & Control-44)							
S. No.	Groups	Demographic Variables		Level of Knowledge		χ^2	P – Value
				Moderate	Adequate		
1..	Experimental Group	Caste	General	7	29	χ^2.124 df-1	0.725 (NS)
			Scheduled caste	2	6		
	Control Group		General	33	3	$\chi^2$4.728 df-1	0.030 S*
			Scheduled caste	5	3		
2.	Experimental Group	Type of family	Nuclear	9	21	$\chi^2$5.280 df-1	0.022 S*
			Joint	0	14		
	Control Group		Nuclear	20	3	χ^2.014 df-1	0.905 (NS)
			Joint	18	3		
			Only can able to read				
3.	Experimental Group	Total work experience of ASHA worker	1-4 yrs	2	16	8.746 df-2	0.013 S*
			5-8 yrs	5	19		
			9-12yrs	2	0		
	Control Group		1-4 yrs	22	5	1.446 df-2	0.485 (NS)
			5-8 yrs	15	1		
			9-12yrs	1	0		
4.	Experimental Group	Regular usage of mobile phones	Yes	8	30	0.061 df-1	0.805 (NS)
			No	1	5		
5.	Experimental Group	Population served by ASHA worker	1000-2000	0	12	4.243 df-1	0.039 S*
			>2000	9	23		
	Control Group		1000-2000	21	3	0.058 df-1	0.810 (NS)
			>2000	17	3		

DISCUSSION:

MCH care is one of the important tasks of ASHA. The current study was conducted to assess the Effectiveness of the usability of smart phone and skill training on knowledge regarding Antenatal health services among health workers in Bangalore.

The present study revealed that 29-34 years represent the highest frequency in both experimental and control groups (38.6%). The study revealed that of knowledge improves from an immediate post-test mean score of 23.65 (SD: 3.964) to 27.22 (SD: 2.963) after one month. This shift is accompanied by a decline in "Moderate knowledge" from 61.3% to 27.3% and a rise in “Adequate knowledge from 38.7% to 79.6%. These results highlight substantial knowledge enhancement. Comparatively, the control group's progress is observed through different assessment stages. Immediate post-test yields a mean score of 2.06 (SD: 0.254), slightly increasing to 2.13 (SD: 0.347) after one month. "Moderate knowledge" decreases from 93.2% to 86.4% during the pre-test to subsequent post-tests, while "Adequate knowledge" increases from 6.8% to 13.6%. This suggests a moderate increase in knowledge, particularly in the "Moderate knowledge" category.

Kaur, Manhardeep *et al* **[21]**. Study revealed that a majority (37.5%) of ASHA workers were in the age group of 35–39 years, similar to the findings of a study done by Kohli *et al* **[6]**. The findings were not in coherence with the study of Sugandha **[22]** and Jagannath **[22]** where the majority belonged to the age group of 25–34 years. Most of the ASHAs (34.7%) covered a population of 1000–1199, similar to the study finding of Shet *et al* **[23]**. and contrary to the findings of Sugandha **[3]** and

Jagannath **[3]** and Pal *et al* **[5]**. As per the present study, majority of ASHAs (56.9%) were matriculate pass, similar to the study findings of Pal *et al* **[24]** and Azarudeen *et al* **[25]** and contrary to the study finding of Rohith and Angadi **[26]**. Most of the (38%) ASHA workers belonged to middle class, which is not similar to the findings of a study conducted by Karir *et al* **[27]**. The difference in socioeconomic status may be due to the different study areas and geography.

LIMITATIONS OF THE STUDY

ASHA workers those who are working in selected PHC were selected for the study. Further knowledge of the ASHA workers was assessed only in Antenatal care services.

CONCLUSION:

Training of ASHAs had a positive effect on knowledge, skills and activities undertaken by her. The results of training get affected by training facilities, teaching techniques and trainer's efficiency and much on the learners/participants. As in our study one fourth of the participants who did not have necessary qualification might be responsible for poor results and mean knowledge score obtained. Thus, training was helpful to ASHAs not only for improving knowledge but also for improving skills and developing confidence in ASHAs to undertake different activities which they hesitate prior to training. This will definitely help in attaining MDGs and will fill the gap of Antenatal care and health services in rural areas of the country.

The study encompassed participants aged 29-34, with the most common age group (38.6%) in both groups. Both groups comprised exclusively female participants. Predominantly Hindu (70.5% experimental, 79.5% control) and educated up to secondary school (81.8% experimental, 72.7% control), both groups were largely married (84.1% experimental, 93.2% control), and from the "General" caste (81.8% each). While nuclear families were prominent in the experimental group (68.2%), the control group had 52.3%. Around 47.7% of the experimental group were proficient in English, reading and writing, whereas 79.5% of the control group only read English. Notably, 54.5% of the experimental group had 5-8 years of experience compared to 36.4% in the control group. Both groups reported using smart phones (100%) but varied in mobile phone usage (experimental: 86.4%, control: 100%).

Furthermore, the study demonstrated that skill training significantly improved ASHA workers' knowledge about antenatal health services, especially in the experimental group that received training. Smartphone usability also saw a post-training improvement. Associations were found between knowledge levels and specific socio-demographic variables, suggesting

potential avenues for future research to explore the impact of demographic factors on training effectiveness and knowledge retention among ASHA workers. Incorporating these insights could enhance healthcare interventions and education in similar contexts.

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Further, for any queries please let us know.

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