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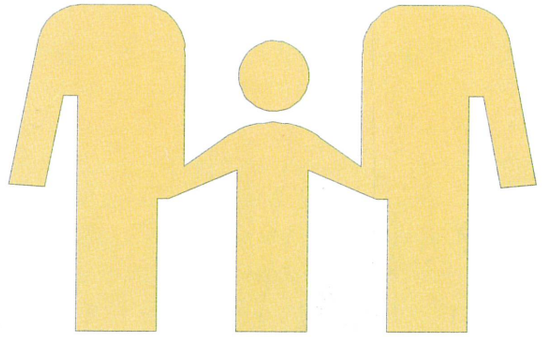

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National Institute of Health and Family Welfare, Baba Gang Nath Marg,
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E. mail: director@nihfw.org
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2. PRAKASH C.M. (1977): A Guide to Communication System in Hospital; New Delhi, Wiley publications,p.38

.Chapter of a Book

3. DANDEKAR R. & MINSAS P. (1973): Control of Cross-infection in Hospitals; in: Kuppuswamy m. (ed.), Hospital Management in India, Bombay, Somaiya Publication, P.100

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MODELLING A BI-DIRECTIONAL WEALTH VS. HIV/AIDS RELATIONSHIP IN KENYA: AN EMPIRICAL ANALYSIS WITH POLICY IMPLICATIONS

Sandra Mukulu*, Samanthala Hettihewa and Christopher S. Wright*****

ABSTRACT

This study evaluates whether the wealth to HIV/AIDS relationship is uni- or bi-directional and whether it reveals socio-economic factors that can contribute to mitigating the HIV/AIDS epidemic. After a brief overview of poverty and AIDS in Kenya and Sub-Saharan Africa, this study outlines key research questions, draws hypotheses from the HIV/AIDS literature and develops demographic models to evaluate postulated relationships between HIV/AIDS and Kenyan socio-economic factors. An econometric analysis of 6,350 individuals (drawn from a Kenyan Demographic Survey of 37,600) found that, while poverty is not a significant driver of AIDS, AIDS likely increases poverty. The study confirms the findings in earlier studies that behavioural choices can predispose individuals and their spouses to HIV infection and that those choices are facilitated by higher incomes, occupation, geographic location and/or mobility. These findings provide insight as to how the HIV/AIDS epidemic can be mitigated.

Keywords: Socio-economic Demography, HIV/AIDS, Policy, Kenya

INTRODUCTION

This study provides insight as to how Acquired Immunodeficiency Syndrome (HIV/AIDS) is related to key demographic and geographic factors in Kenya and should interest policy makers seeking mitigate the economic and social harm imposed by this affliction.

Many researchers have called HIV/AIDS disease of poverty (Pilot, et al, 2007) and others (e.g. Singh and Jain, 2009) note how HIV/AIDS dampens a nation's

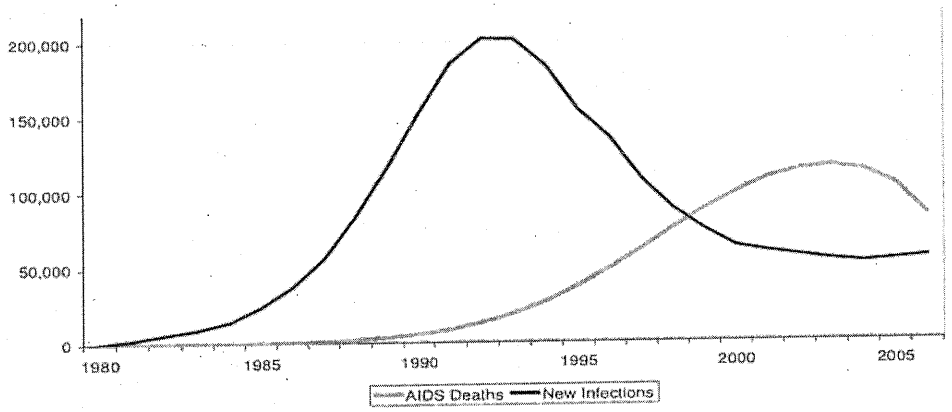
*Lecturer in Statistics, Economics and Accounting, Melbourne Institute of Technology and a PhD candidate in Finance at the University of Ballarat Australia; **Senior Lecturer in Finance at the Business School, University of Ballarat, Australia; and ***Associate Professor at the Business School, University of Adelaide, Australia.

Haacker (2002) highlights the costs of AIDS by noting mortality in the working age population, deterioration in the quality of health services due to overcrowded hospitals, increased economic risk and a rise in production costs, increased training, medical treatment and death-related costs, as some of the effects of the epidemic. Singh and Jain (2009 p.59) in the study on HIV/AIDS awareness in India, state that "HIV/AIDS is retarding economic growth by destroying human capital by mainly affecting the young adults in the age group of 15-24 years who are in their most productive ages of life".

The African nations worst affected by AIDS are mainly in Eastern and Southern parts of Sub-Saharan Africa (Whiteside, 2002).

There was a steady growth in the rate of HIV infection in Sub-Saharan African countries from 1980 to 2009 (UNAIDS, 2010, p. 27) and, after 2003, there were significant declines in the lethality of AIDS and the rate of HIV infection in Kenya(Figure 1).

FIGURE 1
NEW INFECTIONS AND AIDS DEATHS (KENYAN ADULTS, 1980-2006)



Source: UNAIDS, 2010, p. 22 Year

The decline in HIV/AIDS is due to many factors (e.g. change in sexual behaviour, increased anti-retrovirus treatments, and AIDS campaigns; UNAIDS, 2010). However, the poverty implications of the HIV/ AIDS epidemic are likely to reverberate in Africa for generations with increased level of orphaned-child-headed households (White, et al., 2001).

disease, have better diets, and less stress from other sources. Consequently, wealth gives infected individuals advantages in avoiding or delaying the shift from being HIV positive to suffering AIDS. The hypotheses tested in this study are:1) H_o: Poverty has a positive correlation with HIV infection; 2) H_o: Age is an important determinant of the prevalence of HIV/AIDS in Kenya: 3) H_o: The gender of the head-of-house should not influence the risk of HIV infection; 4) H_o: Cultural and/or religious customs influence the risk of HIV infection; 5) H_o: Education reduces the predisposition to HIV/AIDS in Kenya; 6) H_o: Geography is an important determinant of the prevalence of HIV/AIDS in Kenya; 7) H_o: Individuals living with HIV/AIDS are less likely to be employed; and 8) H_o: Wealth is less important to the HIV infection rate in poor countries than other factors/behaviours that tend to be highly correlated with wealth.

METHODOLOGY, ANALYSIS AND FINDINGS

Two approaches are used: a) Econometrics (equations (1) to (9)) examines multiple factors within models, in an effort to understand any simultaneous-bi-directional causal relationship between wealth and HIV in Kenya and b) Inspection and factor/ descriptive analysis (equations (i) to (v)) of the sample demographics and others sources of data are used to evaluate potential confounding factors that may affect the econometric analysis. The statistical analysis uses a 6,360 stratified sample of observations that are drawn from 37,612 in the 'Kenya Demographic and Health Survey Data 2003' (CBS Kenya, 2004). The regression analysis was performed using the STATA 11 software.

Descriptive Analysis of Poverty and HIV

Contrasting HIV infection rates in 2007/08 with GDP/capita data by nation CIA, 2011 suggests HIV is a disease of poverty. However, the structure in the unexplained variance when GDP is below $15,000 USD needs to be examined. If the sample of nations is limited to Sub-Saharan, eastern African nations, HIV prevalence among adults (ages 15-49) initially rises with per capita GDP and then falls (Figure 2). The correlation of the function in Figure 2 is high (R^2 = 87.0 %), when it is described by:

$$H = -0.0000007G2 + 0.0095G - 3.821 \qquad (i)$$

H = HIV Prevalence among adults (15-49)
G = GDP/Capita Purchasing-power-parity in 2003

identified in the literature review, to model a simultaneous bi-directional poverty-to-AIDS relationship in Kenya.

The KDHS national survey has interview results from 8,561 Kenyan households and contains 37,612 observations (Frölich and Vazquez-Alvarez, 2009). KDHS contains 354 variables with detailed information relating to fertility, education levels, domestic violence, sanitation, employment, mortality, nutrition and HIV infection. This study uses a randomly-selected sample of 6,360 individuals to make inferential-statistic conclusions about the Kenyan population and/or selected provincial locations.

Bi-directional relationship between HIV/AIDS and wealth

This study develops wealth model and an HIV/AIDS model to describe a) how HIV infection can impoverish an infected person and b) how poverty predisposes a person to HIV infection. The first model has HIV infection as an independent variable and poverty as the dependent variable and the second model has poverty as an independent variable and HIV infection as the dependent variable.

The country-specific factors identified, gender, provincial residence, number of unions or spouses an individual has, religious background, the level of education attained, sex of the head of the household, employment status and the age of a respondent, were included in the two proposed models in order to determine if the data supports the theoretical arguments of previous authors.

Variables (see Appendix B)

The variables in this study's econometric models are listed in and the associated Kenyans demographics are: 1) Female 50.4 per cent; 2) Muslims 12.7 per cent; and 3) Polygamous 9.0 per cent; Education and employment rates are: 1) 82.3 per cent had primary education, or less—implying that few Kenyans (about 17.0 percent) attain secondary or tertiary levels of education and only 53.2 per cent were employed. The surveyed population is predominantly young (mean age of 27.3 years).

Wealth Model

The probability of a Kenyan being wealthy and impact of a change in a person's HIV status on their wealth was evaluated in the model. The wealth index was used a dependent variable and a dummy variable represented HIV-test results (equalled one, if the HIV test result was positive) as an independent variable.

symbol represents the cumulative distribution function used to estimate the log likelihood and can be computed as shown in equation 3 based on the normal distribution assumption of the error term.

An ordered probit model was estimated and its results were reproduced in Table C.1 of Appendix C. The probability of falling into different wealth categories can be calculated using equation 1. The estimated model has a final log likelihood of -7330.3062 and a likelihood ratio chi-squared statistic of 2936.48 with a p-value of 0.0000. This means that at least one of the estimated coefficients is not equal to zero and that at any level of significance this model appears to have overall significance compared to a model that omits all the independent variables.

Evaluation of the estimated coefficients of the Wealth Model (i.e. are the wealthy different)

Table C.1 of Appendix C shows the results of hypothesis tests conducted at a 1 per cent, 5 per cent and 10 per cent level of significance where the null and alternative hypotheses are defined, respectively, as H_0: $\beta_k=0$ and H_1:$\beta_k\neq0$. At a 10 per cent level of significance, the tests indicate that the effect of Muslim, female head and age variables are statistically insignificant. Consequently, these variables are not be relevant in explaining an individual's probability of falling in a particular wealthy category; rather it is one's education level, current employment status, number of spouses, HIV status and provincial location that determine an individual's wealth status. For instance, a female-head who is highly educated and employed may be able to achieve a higher wealth status than a female-head who has no education and is unemployed.

The estimated wealth model reports negative signs for the polygamy, Muslim and age squared coefficients and positive signs for all the other estimated coefficients. The positive signs of the provincial coefficients is as expected and suggests that respondents in all provinces are more likely to be wealthy than respondents in North Eastern province. Similarly, the positive sign of the education coefficients conforms to the expectation that attaining more than a pre-school level of education is associated with higher levels of wealth. As those earning an income and being older usually have an increased capability to earn as well as accumulate wealth, the signs of the employed and age coefficients are as expected.

The positive HIV test coefficient suggests Kenyans who test positive for HIV are more likely to be wealthy. The positive sign is as expected since wealthier individuals are more mobile, more likely to have multiple partners and able to live with HIV for longer periods (due to financial capability to pay for treatment) compared to

relationship between poverty and AIDS/ HIV at a provincial level. Modifying the model involves dropping all the provincial dummy variables so that:

$$Pr\,(WEALTH_i=j)=f(FEMALE,HHPOLYGAMY,MUSLIM,EDU\_PRIMARY,\\ EDU\_SECONDARY,EDU\_HIGHER,FEMHEAD,EMPLOYED,AGE,AGESQ,HIVPOS) \quad (5)$$

Using observations from a province of interest, the suggested model (5) can estimate and the computed marginal effects of all wealth categories used to assess the nature of the bi-causal relationship between poverty and AIDS at a provincial level. While this can be performed for most provinces, it is not be possible to compute the marginal effects for the poorest, poorer and middle wealth categories of Nairobi province as no data exist.

Moreover as data for this province fall into two categories (the richest or richer wealth category), it follows that a probit model may be more suitable to model the wealth and HIV/AIDS relationship for this province. However, it is questionable how useful it is to evaluate the probability of an individual being in the richer or richest wealth category since there is little difference between the two categories.

For illustrative purposes, observations from Nyanza province were used to implement a modified ordered probit model and compute the respective marginal effects for each wealth category. Table D.1 of appendix D shows the estimated ordered probit model for Nyanza province. The estimated model reports a likelihood ratio chi-square of 124.11 with a p-value of 0.0000 meaning that at least one of the estimated coefficients is significantly different from zero. Furthermore, the estimated model is statistically significant at any significance level compared to a model that excludes all the independent variables.

Evaluation of the estimated coefficients of the modified Wealth Model

Table D.1 (Appendix D) shows the modified ordered probit model for Nyanza province and the results of hypothesis tests conducted at 1, 5 and 10 per cent levels of significance. Each variable was assessed to determine if the coefficient was statistically different from zero at the respective levels of significance. The test results indicate that (at a 10% level of significance) a respondent's age, current employment status, HIV status and acquisition of secondary or tertiary education, are the only statistically significant factors to consider when determining the wealth status of a person living in Nyanza province.

The ordered probit model for Nyanza province reports negative signs for the polygamous, employed and age squared coefficients and positive signs for all the

Aging, results in a significant decrease of 1.44 and 1.07 per cent in the probability of being among, respectively, the poorest and poorer population and 0.68 per cent increased probability of falling in the richer-wealth category. Testing positive for HIV means the respondent is 6.2 and 5.83 per cent less likely to be in, respectively, the poorest and poorer wealth categories and 2.96 per cent more likely to be in the richest wealth category. Further, the model suggests a relationship between "Age" and wealth of the form:

$$W = -a(Age)^2 + b(Age) + c \qquad \text{(ii)}$$

W = Wealth
Age = Age of individual
a, b, c = parameters

Equation (ii) suggests that age has a nonlinear relationship with wealth in the form of a second-order polynomial. When equation (ii) is differentiated with respect to age, set equal to zero and reorder to define Age, the result (See Table C.1, Appendix C) indicates that the peak age for wealth is:

$$Age = .5b/a = 0.5(0.0174)/0.0004 = 21.8 \text{ years} \qquad \text{(iii)}$$

In equation (ii), parameter "a" is significant to 5 per cent, but parameter "b" is not significant.

The HIV/AIDS Model

This econometric model will use the HIV test dummy variable as the dependent variable. In addition to the country specific variables used in the ordered probit model, five independent variables were introduced to represent the five wealth categories as defined by the wealth index (NB: the poorest-wealth dummy was omitted from the regression model to avoid collinearity problems in the estimation of the model).

Due to the binary nature of the dependent variable, this research suggests a probit or logit model would be suitable to design this model. Both models will provide similar proportions of accurate estimations and only differ in the assumed distribution of the error term. A probit model, which assumes normal distribution of the error term with a mean of 0 and a variance of 1, will be used to implement the model shown in equation 6.[5] This probit model was estimated using the log

[5]No HIV tests were conducted in North Eastern province. Hence, this research is based on data from seven provinces with Eastern province being used as the reference group, to avoid collinearity.

This function form suggests that age, like relative income (see, Figure 4), has a nonlinear relationship with HIV/AIDS in the form of a second-order polynomial. When equation (iv) is differentiated with respect to age, set equal to zero, reordered to define Age, and the parameter values substituted in (see, Table E.1, Appendix E), the result indicates that the peak age for HIV/AIDS is:

$$\text{Age} = .5b/a = 0.5(0.1012)/0.0017 = 29.8 \text{ years of age} \quad \text{(v)}$$

The parameters in equation (v) are significant to 1 percent (see, Table E.1, Appendix E) and strongly support hypothesis 2 (that: Age is an important determinant of the prevalence of HIV/AIDS in Kenya). The non-linear nature of this relationship is important to model design.

As expected, the positive signs of the female, female head and polygamous coefficients offer credence to the argument that women, female heads and polygamous people are more likely to be infected with HIV. Thus, hypothesis 3 (that: The gender of the head-of-house should not influence the risk of HIV infection) is refuted. However, given there is no rational reason to expect that a female head-of-house is predisposed to HIV, a more likely explanation is that an HIV infected spouse has died and left his wife/wives as an HIV infected head-of-house.

Evidently, (per the negative coefficients in Table E.1, Appendix E) employed Kenyans are less likely to be HIV positive than the general population. This finding when combined with the positive coefficients (significant at 5 percent) for polygamy and Muslim support hypothesis 4 (that: Cultural and/or religious customs influence the risk of HIV infection). Future research needs to examine the effect of Muslim customs on the risk of HIV/AIDS. The negative parameter on employment (significant to 5 percent) supports hypothesis 7 (that: Individuals living with HIV/AIDS are less likely to be employed).

While it is generally argued that having a higher education means that an individual has a lower chance of being HIV positive, the positive sign of the primary school coefficient suggests that Kenyans with this level of education have a higher risk of HIV infection, as compared to people with no education. With the exception of this group, the signs of the other education coefficients conform to expectations. These parameters are not statistically, but they are suggestive that education should be treated as a non-linear variable with a little education being a risk factor and higher levels of education reducing risk. Thus, hypothesis 5 (that: Education reduces the predisposition to HIV/AIDS in Kenya) is plausible but unproven.

Provincial HIV/AIDS Model

The probit model suggested in equation (6) can be modified to assess the relationship between poverty and AIDS/ HIV at provincial level. The suggested modification of the model would involve dropping all the provincial dummy variables such that the new model is defined as shown in equation (9).

$$Pr(HIV\ POS_i = 1) = f\ 9FEMALE, HHPOLYGAMY, MUSLIM, EDU\ PRIMARY, EDU\ SECONDARY, EDU\_HIGHER, FEMHEAD, EMPLOYED, AGE, AGESQ, WEALTH\_POORER\ WEALTH\ MIDDLE, WEALTH\ RIGHER, WEALTH\ RICHES) \quad (9)$$

The estimation of a provincial specific model can be implemented using observations from the province of interest. For example, Nyanza province was used to estimate a modified probit model and the results of the regression were replicated in Table F.1 of appendix F. In estimating the modified model, the Muslim variable was dropped as it contained too few observations; out of 816 respondents, only one was Muslim and the individual was HIV negative. The estimated model reports a likelihood ratio chi-square of 51.23 with a p-value of 0.0000 meaning that at least one of the estimated coefficients is significantly different from zero. Hence, the Nyanza HIV model has overall significance compared to a model that omits all the independent variables.

Evaluation of the estimated coefficients of the modified HIV/AIDS Model

Hypothesis tests at a 10 per cent level of significance reveal that factors that significantly determine an individual's probability of being HIV positive include gender, current employment status, an individual's age and being in the richer or richest wealth categories. The modified probit model indicates that religious background, level of education attained by an individual and being in the poorer or middle wealth categories are not statistically different from zero. Consequently, these factors are not important in assessing the probability of a Nyanza respondent being HIV positive.

The positive signs of female, female head and age coefficients conform to the expectation that these groups are more likely to be HIV positive compared to the rest of the Nyanza province population. The negative sign of the employed population is sensible as several authors suggest this group is less likely to be HIV positive compared to the general population. With the exception of the primary education group, the negative signs of the other education variable support the notion that attaining higher levels of education means an individual is less likely to engage in a risky behaviour that would cause HIV infection. Similarly, all wealth

able to engage in behaviours that increase their risk of exposure to HIV infection, and ii) Once HIV positive, benefit from increased financial capacity to effectively defer and manage/treat AIDS related illnesses.

The second-order polynomial income to HIV/AIDS function is interesting and should be studied further. In terms of the nations of the eastern half of Sub-Saharan Africa, as is the second-order polynomial age to HIV/AIDS function. The differential of the age function suggests that 30.3 is riskiest age, in terms of being found positive for HIV/AIDS. Thus, HIV/AIDS is very much a disease of young adults, with the greatest risk of infection in the early to mid-twenties.

While poverty does not significantly increase the risk of HIV infection, HIV/AIDS appears to be a major driver of poverty via unemployment and a dramatic increase in the number of heads-of-house who are widows and children and may themselves be sick with HIV/AIDS.

A significant important paradox occurred between the education to wealth findings of the wealth model and the education to HIV/AIDS findings in the HIV/AIDS model. Specifically, there is a very strong correlation between education and wealth and a strong correlation between wealth and HIV/AIDS, but a weak and negative correlation between education and HIV/AIDS. Logically, the first two correlations should lead to a positive correlation between education and HIV/AIDS. This contrary finding is well worth researching further, especially as there was a weak positive correlation between completion of grade 12 and HIV/AIDS and a negative correlation between higher education and HIV/AIDS. This study found that many significant, complex and inter-related factors drive the risk of HIV infection and survival duration of people living with HIV/AIDS suggesting further and that these complexities mean that, simple regression models of HIV/AIDS will generate precise results, but the results of such models will very likely to be simply-and-precisely wrong.

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APPENDIX B

TABLE B.1
DESCRIPTIVE STATISTICS FOR VARIABLES USED IN MODELS

Dichotomous Variables	Min.	Max.	Frequency	Cum. Freq.	Mean %	Std Dev.
Female*	0	1	18944		50.37	
Polygamous household	0	1	3359		8.93	
Muslim	0	1	4757		12.65	
Employed*	0	1	16858		53.20	
HIV test result*	0	1	422		6.64	
Female head	0	1	10623		28.24	
Nairobi province	0	1	4191	4191	11.14	
Central province	0	1	5920	10111	15.74	
Coast province	0	1	4375	14486	11.63	
Eastern province	0	1	4653	19139	12.37	
Nyanza province	0	1	4622	23761	12.29	
Rift valley province	0	1	6608	30369	17.57	
Western province	0	1	4558	34927	12.12	
North Eastern province	0	1	2685	37612	7.14	
Completed Pre-school education or has none education*	0	1	13357	13357	35.72	
Completed Primary education*	0	1	17407	30764	46.55	
Completed Secondary education*	0	1	5019	35783	13.42	
Completed Higher education *	0	1	1610	37393	4.31	
Poorest-wealth category	0	1	7585	7585	20.17	
Poorer-wealth category	0	1	6556	14141	17.43	
Middle-wealth category	0	1	6925	21066	18.41	
Richer-wealth category	0	1	7137	28203	18.98	
Richest-wealth category	0	1	9409	37612	25.02	

APPENDIX C

TABLE C.1
WEALTH MODEL FOR KENYA

Variable	Coefficient	Standard Error	Z-statistic	Probability of Z-statistic
Female	0.1718***	0.0317	5.41	0.000
Nairobi province respondent	3.2514***	0.1485	21.90	0.000
Central province respondent	0.9049***	0.1167	7.76	0.000
Coast province respondent	0.8888***	0.1014	8.77	0.000
Eastern province respondent	0.5499***	0.1167	4.71	0.000
Nyanza province respondent	0.3700***	0.1169	3.16	0.002
Rift valley province respondent	0.4166***	0.1137	3.66	0.000
Western province respondent	0.2910**	0.1149	2.53	0.011
Polygamous household	-0.0895*	0.0528	-1.70	0.090
Muslim	-0.0581	0.0770	-0.75	0.451
Completed Primary education	0.6305***	0.0547	11.54	0.000
Completed Secondary education	1.1691***	0.0609	19.20	0.000
Completed Higher education	1.9765***	0.0884	22.35	0.000
Female head	0.0521	0.0343	1.52	0.129
Employed	0.0725**	0.0344	2.11	0.035
Age	0.0174	0.0114	1.52	0.128
Age squared	-0.0004**	0.0002	-1.98	0.048
HIV test result	0.3558***	0.0615	5.78	0.000
Model Fit statistics			Cut-off points	
Log Likelihood	-7330.3062			0.613118
Number of observations	5494			1.320621
LR chi-squared statistic	2936.48			1.936278
LR chi-squared p-value	0.0000			2.715249
Pseudo R-squared	0.1669			

Robust standard errors in parentheses; * indicates coefficient significant at 10% (*), 5% (**) or 1% (***)

APPENDIX D

TABLE D.1
WEALTH MODEL FOR NYANZA PROVINCE

Variable	Coefficient	Standard Error	Z-statistic	Probability of Z-statistic
Female	0.1023	0.0798	1.28	0.200
Polygamous household	-0.1370	0.1231	-1.11	0.266
Muslim	5.5931	100.815	0.06	0.956
Completed Primary education	0.2100	0.1882	1.12	0.265
Completed Secondary education	0.6888***	0.1967	3.50	0.000
Completed Higher education	1.6006***	0.2559	6.25	0.000
Female head	0.0623	0.0891	0.70	0.485
Employed	-0.1671*	0.0974	-1.72	0.086
Age	0.0630*	0.0325	1.94	0.052
Age squared	-0.0012**	0.0005	-2.28	0.023
HIV test result	0.3068***	0.1102	2.78	0.005
Model Fit statistics		Cut-off points		
Log Likelihood	-1214.8920			0.0664
Number of observations	816			1.0730
LR chi-squared statistic	124.11			1.5759
LR chi-squared p-value	0.0000			2.0796
Pseudo R-squared	0.0486			

Robust standard errors in parentheses; * indicates coefficient significant at 10% (*), 5% (**) or 1% (***)

TABLE D.2
MARGINAL EFFECTS OF WEALTH MODEL-NYANZA

	Wealth Status: Marginal Effect /Discrete Effects				
	Poorest	Poorer	Middle	Richer	Richest
Female	-0.0235	-0.0172	0.0040	0.0110	0.0257
	(0.0188)	(0 .0137)	(0.0041)	(0.0088)	(0.0201)
Polygamous household	0.0330	0.0216	-0.0065	-0.0152	-0.0329
	(0.0315)	(0.0184)	(0.0077)	(0.0142)	(0.0283)
Muslim	-0.1467***	-0.3357***	-0.1944***	-0.1553***	0.8321***
	(0.0125)	(0.0170)	(0.0145)	(0.0132)	(0.0134)

APPENDIX E

TABLE E.1
PROBIT MODEL FOR HIV IN KENYA

Variable	Coefficient	Standard Error	z-statistic	P(Z-stat.)
Female	0.2824***	0.0607	4.65	0.000
Nairobi province respondent	0.1690	0.1259	1.34	0.179
Central province respondent	0.0639	0.1113	0.57	0.566
Coast province respondent	0.2512**	0.1201	2.09	0.036
Nyanza province respondent	0.7182***	0.1026	7.00	0.000
Rift valley province respondent	0.0786	0.1103	0.71	0.476
Western province respondent	0.1948*	0.1139	1.71	0.087
Polygamous household	0.2028**	0.0913	2.22	0.026
Muslim	-0.2717**	0.127	-2.14	0.032
Completed Primary education	0.0817	0.1079	0.76	0.449
Completed Secondary education	-0.0335	0.1192	-0.28	0.779
Completed Higher education	-0.1042	0.1483	-0.70	0.482
Female head	0.2301***	0.0598	3.85	0.000
Employed	-0.1174*	0.0607	-1.94	0.053
Age	0.1012***	0.0223	4.53	0.000
Age squared	-0.0017 ***	0.0004	-4.49	0.000
Poorer-wealth category	0.2245**	0.1077	2.08	0.037
Middle-wealth category	0.2412**	0.111	2.17	0.030
Richer-wealth category	0.4904***	0.1064	4.61	0.000
Richest-wealth category	0.6167***	0.109	5.66	0.000
Constant	-3.6994***	0.3352	-11.04	0.000
Model Fit statistics				
Log Likelihood	-1258.5912	LR chi-squared statistic	225.21	
Number of observations	5494	LR chi-squared p-value	0.0000	
Pseudo R^2	0.0821			

* indicates coefficient significant at 10% (*), 5% (**) or 1% (***)

TABLE E.2
MARGINAL EFFECTS OF HIV MODEL-KENYA

Variable	Marginal Effect or Discrete Change	Standard Error
Female	0.0298***	0.0061
Nairobi province respondent	0.0207	0.017
Central province respondent	0.0073	0.0131

APPENDIX F

TABLE F.1
PROBIT MODEL FOR HIV IN NYANZA

Variable	Coefficient	Standard Error	z-statistic	Probability of z-statistic
Female	0.2452**	0.1234	1.99	0.047
Polygamous household	0.2584	0.1780	1.45	0.147
Completed Primary education	0.1858	0.2881	0.64	0.519
Completed Secondary education	-0.0799	0.3051	-0.26	0.794
Completed Higher education	-0.3157	0.3975	-0.79	0.427
Female head	0.1066	0.1313	0.81	0.417
Employed	-0.4908***	0.1457	-3.37	0.001
Age	0.2144***	0.0539	3.98	0.000
Age squared	-0.0034***	0.0009	-3.85	0.000
Poorer-wealth category	0.0559	0.1799	0.31	0.756
Middle-wealth category	-0.1569	0.2146	-0.73	0.465
Richer-wealth category	0.3845*	0.2034	1.89	0.059
Riches-wealth category	0.4123**	0.1967	2.10	0.036
Constant	-4.2031***	0.7641	-5.50	0.000
Model Fit statistics				
Log Likelihood	-307.8594	LR chi-squared statistic	51.23	
Number of observations	815	LR chi-squared p-value	0.0000	
Pseudo R-squared	0.0768			

Robust standard errors in parentheses; * indicates coefficient significant at 10% (*), 5% (**) or 1% (***).

TABLE F.2
MARGINAL EFFECTS OF HIV MODEL-NYANZA

Variable	Marginal effect/Discrete change	Standard Error
Female	0.0491**	0.0241
Polygamous household	0.0590	0.0448
Completed Primary education	0.0370	0.0559
Completed Secondary education	-0.0160	0.0598
Completed Higher education	-0.0545	0.0565
Female head	0.0225	0.0285

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A CROSS-SECTIONAL STUDY ON ADHERENCE TO ANTI-RETROVIRALS AMONG HIV/AIDS PATIENTS IN DELHI UNDER THE NATIONAL ART PROGRAMME

Sanjay Sinha*, M. Bhattacharya and S.V. Adhish*****

ABSTRACT

The key objective of this study was to assess the proportion of non-adherence among HIV/AIDS patients taking treatment at the ART centres of Government Hospitals in Delhi and also to explore the factors associated with it. Five hundred HIV-posotive (HIV+) patients under treatment at the ART centres were interviewed. Proportion of non-adherence was assessed from the patient's self report of prescribed drugs consumed over the last 4 days of drug-intake. Logistic regression analysis was applied to explore the factors associated with non-adherence. 37 per cent of the respondents were found to have non-adhered to ART. On multivariate logistic regression analysis, illiteracy (adjusted OR=7.36, CI: 1.38-39.10), alcohol intake during last 30 days (adjusted OR=7.70, CI: 4.19-14.14), disclosure of HIV positivity (adjusted OR=1.95, CI: 1.06-3.59), severe depression (adjusted OR=8.88, CI: 4.37-18.03), hospitalization during HIV care (adjusted OR=7.33, CI: 3.48- 15.42) and tuberculosis treatment along with ARV (adjusted OR=2.85, CI: 1.32 -6.17) were found to be associated with non-adherence. The study findings highlight the need for a strong monitoring and evaluation component in ART as it is scaled up. It is felt that the majority of the factors for non-adherence can be prevented with better counselling, and monitoring. Concurrent evaluation can also strengthen the ART programme.

Keywords: ART Programme, Anti-retroviral, Non-adherence

The Anti-Retroviral Therapy (ART) in India was launched on 1st April 2004 at the country-level. Initially it was started in six high prevalence states of Andhra

*MD Student, sanjaysinha08-11@nihfw.org; **Professor and Head, Department of Community Health Administration; ***Professor and Head, Department of Medical Care and Hospital Administration; National Institute of Health and Family Welfare, Munirka, New Delhi-110067.

centres of Government hospitals located in four geographically distinct areas of Delhi, namely- Dr R.M.L Hospital in the central region, B.S. Ambedkar Hospital in the northern region, D. D. U. Hospital in the western region and S.J. Hospital in the southern region. These patients were following the treatment schedule as per the NACO's prescribed guidelines[1]. Patients diagnosed with HIV/AIDS, over 18 years of age, received free ART for minimum of two months under the National ART programme and gave their consent to participate, were included in the study. Patients suffering from any acute medical condition, which made them unable to participate in the interview or any condition due to which the patient could not give a valid consent, were excluded from the study.

Statistically significant sample size was calculated as per the details given below:

Proportion of at least 50 per cent[5] non-adherence among HIV/AIDS patients taking ART was considered to get the maximum sample size. Formula for sample size calculation was

$n= z^2P\ (1 - P)/d^2$ where:

n= Size of the sample
p = proportion of drug Non adherence among HIV/AIDS patients taking ART = 0.5
q= 1-p= 0.5
z =1.96 as per table of area under normal curve for confidence level of 95 per cent
d = allowable error, since estimate should be within 5 per cent of true value=0.05.

On calculation, a sample size of 384 was worked out. Since five regions were decided initially for the study, the total sample size was 500; taking 100 from each centre. Initially Delhi was divided into five regions and a major hospital with ART centre giving free ART was selected from each of the five regions, namely East, West, North, South and Central regions. Later, the hospital in East Delhi did not grant permission to conduct the study which was to be dropped. Thus, the study was restricted to four hospitals with 100 HIV/AIDS patients from three and 200 from one to complete the sample size of 500 patients. Patients were interviewed using a pre-tested interview schedule from October 2009 to January 2010. Patients from each of the ART centres were selected consecutively till the sample size was completed.

Adherence to ART was measured by self-reported dose adherence, defined as patient's self-report of whether any anti-retroviral medication had been skipped on that particular day, the previous day, the previous three days or the previous four days. This type of measurement for adherence had been used in Adult AIDS Clinical Trial Group (AACTG) follow-up questionnaire[6]. Adherence to recommended regimens should be > 95 per cent to avoid development of ARV drug resistance[1].

	Characteristics	Percentage	Frequency N= 500
Literacy	Illiterate	5.6	28
	Read & write	16.8	84
	educated till 10th	65.6	328
	Educated till 12th	5.4	27
	graduate	6.6	33
Marital status	Married	78.6	393
	Separated/Divorced	1.2	6
	Widowed	9.4	47
	Never Married	10.8	54
Socio-economic status	Lower Socio Economic Status	2	10
	Upper Low Socio economic status	66.8	334
	Lower Middle Socioeconomic Status	26.2	131
	Upper Middle Socioeconomic Status	5	25
Type of family	Nuclear	50.6	253
	Joint	49.4	247

Measuring Adherence

The adherence proportion of the study subjects is given in Table 2. Sixty three per cent of the respondents reported an adherence rate of cent per cent. Remaining 37 per cent of them reported an adherence rate of <95 per cent (none adhered) by self-report in the last four days preceding the interaction with the samples.

TABLE 2
ADHERENCE PROPORTIONS OF PATIENTS ON ART

No of doses for ART prescribed in last 4 days/ should have taken (a)	No of doses for ART actually taken in last four days (b)	No of doses for ART Left in last four days (C = a – b)	Adherence Proportion = a – c / a*100	No of patients.*
8	8	0	100%	315
8	7	1	87.50%	8
8	6	2	75%	39

	Characteristics	Non -Adherence	Unadjusted Odds Ratio (95% CI)	P Value	Adjusted Odds Ratio (95% CI)	P Value
Age*	< 30 years (n=216)	80 (37)	1			
	30-45 years (n=247)	91 (36.8)	0.992 (0.672 - 1.448)	0.9		
	> 45 Years (n=37)	14 (37.8)	1.035 (0.504 - 2.125)	0.9		
Literacy	Illiterate(n=11)	17 (61)	8.65 (2.56 - 2.92)	0.001	7.36 (1.38 - 39.10)	0.01
	Read & write (n=59)	25 (30)	2.37 (0.82 - 6.85)	0.11	1.98 (0.46- 8.39)	0.3
	Till 10th (n=193)	135 (41)	3.91 (1.47 - 10.40)	0.006	2.48 (0.68 - 9.03)	0.1
	Till 12th (n=24)	3 (11)	0.7 (0.15- 3.23)	0.64	0.56 (0.054 - 5.83)	0.6
	Graduate (n=28)	5 (15)	1			
S E *	Lower (n=10)	8 (80)	4.33 (0.76- 24.61)	0.9		
	Upper low (n=334)	115 (34)	0.56 (0.25 - 1.28)	0.1		
	Low mid (n= 131)	50 (38)	0.66 (0.28 - 1.58)	0.3		
	Upper mid (n=25)	12 (48)	1			
Family*	Nuclear (n=253)	113 (45)	1.34 (0.31 - 5.75)	0.6		
	Joint (n=247)	72 (29)	1	0.5		
Visits	2 -15 (n=133)	93 (41)	1			
	16 to 45 (n=270)	78 (32)	0.65 (0.45 - 0.95)	0.02	0.43(0.25-0.75)	0.003
	> 45 (n= 12)	14 (54)	1.66 (0.73 - 3.77)	0.2	0.52(0.16- 1.7)	0.2
Alcohol intake in last 30 days	Never (n= 364)	92 (25.3)	1			
	Once/more (n=136)	93 (68.4)	6.39 (4.15 -9.84)	0	7.7 (4.1-14.1)	0
Support during situation of crisis	Spouse (n=357)	122 (34.2)	1			
	Relatives (n=37)	15 (40.5)	1.31 (0.658 - 2.62)	0.4	0.0.67 (0.23-1.9)	0.4
	Friends (n=13)	3 (23.1)	0.57 (1.56 -2.13)	0.4	0.04 (0.05- 3.4)	0.4
	Others (n=25)	10 (40)	1.28 (0.56 -2.94)	0.5	0.4 (0.01- 17.2)	0.03
	None (n= 68)	35(51.5)	2.04 (1.21 -3.44)	0.007	0.02 (0.01-0.62)	0.02
Who accompany the patient to collect ART	Spouse (n=288)	95 (33)	1			
	Relatives (33)	13 (39.4)	1.32 (0.63 - 2.76)	0.4		
	Friends (17)	5 (29.4)	0.84 (0.29 -2.47)	0.7		
	Others(n=23)	9 (39.1)	1.30 (0.54 - 3.12)	0.5		
	None (n= 139)	63 (45.3)	1.68 (1.11- 2.54)	0.01		
Disclosure of HIV status						
	Yes (n=137)	77 (56.2)	3.03 (2.02 -4.54)	0	1.95 (1.06-3.59)	0.03
	No (363)	108 (29.8)	1			
Current depression	NO (n=206)	33 (16)	1			
	Mild (n=83)	37 (44.6)	4.21 (2.38 - 7.46)	0	3.64 (1.72-7.72)	0.001
	Mod n (n=86)	36 (41.9)	3.77 (2.14 - 6.65)	0	6.03(2.74-13.28)	0
	Severe (n=125)	79 (63.2)	9.00 (5.35 - 15.14)	0	8.88 (4.37-18.03)	0

India and abroad reported almost similar findings. Bajaj shah et al[9] in their study found the socially supported ART clients were more likely to report adherence than those who were unsupported. In contrast to another study[10], disclosure of the HIV status in this study was found to be associated with non-adherence. This may be because the patients on ART are being stigmatised after disclosure leading to gaps in drug intake. This aspect needs further research.

In this study, depression and hospitalization emerged as important independent predictors of non-adherence which is similar to the findings of another study[5] conducted in Delhi and Pune where severely depressed ART clients were found more likely to report non-adherence and hospitalization during ART indicating severity of the disease, likely to cause non-adherence. Increased waiting time indirectly indicates poor quality of services and this factor observed in the present study as well as in other studies[11] conducted in India on non-adherence. Dual treatment of TB and HIV was likely to precipitate poor ART adherence which may be because of more number of doses, resulting in additional side effects. Several other studies have also indicated higher number of doses as an important reason behind the ART non-adherence[12]. However, their role in the context of both Anti Tubercular and anti-retroviral are required to be studied.

Limitations of the study are that the data from East Delhi could not be collected due to lack of permission and hence, the area is not represented in the sample and also adherence was measured only by self-report, which is generally higher than the objective adherence measures. Furthermore, a cross-sectional design limits the inferences that can be made regarding causal relationships among variables; as such variation is not reflected in a cross-sectional design. Non-adherence among patients highlights the need for a strong monitoring and evaluation component in the National ART programme as it scales up. Achieving optimum adherence requires the commitments of both the patients and providers. Physicians and counsellors can better serve their patients by providing thorough information and open discussion about ART adherence well before the initiation of therapy and extending the same throughout the patient's life time. Vocational training for developing a pool of counsellors may be taken up to manage the cases of depression which leads to non-adherence among patients on ART. Though simultaneous treatment of HIV and TB treatment leads to higher rates of non-adherence, researchers need to formulate specific regime with lesser doses and drugs so that patients do not discontinue ART.

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STUDY OF DRUG INVENTORY MANAGEMENT OF A TERTIARY CARE RURAL TEACHING HOSPITAL OF CENTRAL INDIA

Ghia Canna J.*, Patil Abhishek S. and Jha Rajesh K.*****

ABSTRACT

Drug inventory management is essential for optimum utilisation and cost containment of the annual drug budget. Medication cost minimization without compromising the quality of medication is of great significance in a rural teaching hospital. The newly devised drug formulary of the pharmacy consisted of 569 drugs. ABC analysis revealed 14.93 per cent, 20.04 per cent and 65.03 per cent drugs as A, B and C Group drugs respectively. VED analysis showed 9.67 per cent, 55.36 per cent and 34.97 per cent drugs as V, E, and D Group drugs, respectively. In a rural hospital greater emphasis should be laid on the availability of vital and essential drugs. ABC and VED analysis are drug inventory management tools that help in decision making in purchase and distribution of drugs.

Keywords: Hospital Inventory, Hospital Pharmacy, Hospital Formulary

INTRODUCTION

Drug expenditure is one of the main components of hospital spending. The performance and functioning of the hospital pharmacy can be assessed by studying the drug inventory management system of the pharmacy.[1,2,3] In a developing country like India, efficient inventory management in a hospital pharmacy is very essential. If rational drug use and improved drug management practices are followed, more number of patients can be served within the existing drug budget.[4] Drug inventory management stresses on cost containment and optimum utilisation. Cost analysis is very important for the management of a medical store. ABC analysis popularly known as 'Always better analysis' is one such cost analysis in which drugs are classified on the basis of the annual drug budget.[2] Another type of analysis is Criticality analysis that is commonly used in hospital inventory management. Criticality analysis involves the classification of drugs as vital, essential and desirable (VED) drugs.[5,6] In a rural hospital greater

*Post-graduate student, **Professor and Head, Jawaharlal Nehru Medical College, Department of Pharmacology, Sawangi (Meghe), Wardha- 442004, Maharashtra, India, and ***Post-graduate student- Seth G.S. Medical College, Department of Orthopaedics, Acharya Donde Marg, Parel, Mumbai-400012, Maharashtra, India.

budget they consume.

6. Calculating the cumulative cost of all the drugs.
7. Calculating the cumulative percentage of expenditure and the cumulative percentage of number of drugs.
8. Subdividing the list into three categories: A, B and C, based on the cumulative cost percentage of 70 per cent, 20 per cent and 10 per cent, respectively.

Similar cut-off s for ABC analysis have been used in published studies.[1,4,5] The cut off s for the three groups were decided taking into consideration Pareto's Principle. Vilfredo Pareto, an Italian philosopher and economist observed that a very large percentage of total national income and wealth (approximately 70%) was concentrated on a small percentage of population (approximately 20%). Pareto's analysis is now considered a universal principle. It is therefore widely used in many situations of business. The Pareto's principle is considered as the rule of thumb in inventory management and expresses that 70 per cent of total drug expenditure is accounted for by 10 per cent of drugs. [9]

CRITICALITY ANALYSIS: VED Analysis

A critical appraisal of the hospital drug formulary was carried according to VED (Vital, Essential, and Desirable) Criticality Analysis.

In this analysis drugs were classified into three groups V, E and D.

Group **V**: vital drugs, without which hospital cannot function.

Group **E**: essential drugs, without which hospital can function but may affect the quality of services.

Group **D**: desirable drugs, unavailability of which will not interfere with the functioning of the hospital .

The VED analysis was carried out by the hospital therapeutic drug committee headed by the Head of Department of Pharmacology. The therapeutic drug committee members included the heads of departments of medicine, surgery, gynaecology, paediatrics and microbiology. The VED status of each drug was discussed and a consensus was reached on regarding the category for classification for each drug on the hospital drug formulary. This list was published and circulated to the different departments for further modifications and suggestions. After considering the inputs from the different departments the final list was prepared by the Department of Pharmacology.

VED Analysis

TABLE 2
VED ANALYSIS OF THE HOSPITAL DRUG FORMULARY

Group of Drugs	No of Drugs	Inventory drugs (%)
V	55	9.67 %
E	315	55.36 %
D	199	34.97 %

Group **V** consisted of 55 drugs (9.67%); Group E included of 315 drugs (55.36%) and Group D comprised 199 drugs (34.97%).

ABC-VED Matrix Analysis

Table 3
ABC-VED MATRIX ANALYSIS

	V	E	D
A	AV	AE	AD
B	BV	BE	BD
C	CV	CE	CD

TABLE 4
ABC-VED MATRIX ANALYSIS OF THE HOSPITAL DRUG FORMULARY

	V (55)			E(315)			D(199)		
		No	%		No	%		No	%
A (85)	AV	19	3.34%	AE	57	10.02%	AD	09	1.58%
B (114)	BV	26	4.57%	BE	58	10.2%	BD	30	5.27%
C (370)	CV	10	1.76%	CE	200	35.14%	CD	160	28.12%

The numbers in the brackets represent the number of drugs in a particular group.

By forming a 6 X 6 matrix of ABC and VED analysis nine different sub-categories of drugs were obtained. The nine sub-categories were AV, AE, AD, BV, BE, BD, CV, CE and CD.

and high consumption rate. Drugs in this group require special attention and comprehensive analysis. It is recommended to stock less but purchase more often for Group A. On the other hand, a contradictory policy should be given to all the vital drugs of Group A because they should be always available in stock to meet emergencies. An occurrence of shortage for vital drugs has a great negative impact on medical service. Hence, this group must be carefully analyzed by regular inventory checks. Safety stock should be sufficient to meet the fluctuating demand levels and emergency situations. There should be more than a few suppliers for each medicine in order to gain better quality, price. The pharmacy staff should try to shorten lead time. Lead time is the time interval between the placement of order and receiving the drug sent by the supplier. EOQ (Economic order quantity) can be utilized to control the AV group. Economic Order Quantity (EOQ) is one of the most popular methods used for calculating quantity of order placement. EOQ is formulated to get trade-off point on basis of regular relationship between ordering cost and carrying cost. The examples of drugs belonging to this category include Insulin 10 ml vial (40 units/ml) injection; cefotaxime 500mg vial injection; metronidazole 100 ml iv injection; atorvastatin 10 mg tablets ; amoxycilline 250 mg capsules etc.

AD (9 drugs) includes medicines with high valued contribution to total inventory but they are considered as desirable drugs. A close surveillance regarding necessity of having these drugs in the inventory should be done. Limiting use of AD group can significantly reduce inventory level and enhance the financial performance. The hospital can consciously work towards reducing the number of AD drugs as these drugs are expensive and since they belong to the desirable category their non-availability will not make significant difference to the quality of health care services. Rational use of drugs in this subgroup can bring about substantial savings without affecting patient care.

The examples of drugs belonging to this category were Botulinum toxin 100 unit vial; Omalizumab 150 mg vial; Imipenum and cilastin IV injection; Octeotride injection; Tobramycin capsule and Ribavarin capsule.

CV (10 drugs) includes vital medicines of low cost and high criticality that should be always available in stock but they do not have a huge impact on financial aspect. Large quantity of order placement for this group can be done to obtain bulk discount. But when determining the order quantity, shelf life of the drugs should be taken into consideration. Monitoring of inventory can be performed once or twice a year for this group. These drugs could even be kept on the free list of drugs as they will not cost the management a lot and will help the hospital to serve the rural population thus improving the reputation of the hospital. The

Category II (288 drugs) includes the remaining drugs of E and B groups (BE, CE, BD).These drugs may be ordered once or twice per annum to save the ordering cost and reduce management hassles at a moderate carrying cost and without blocking substantial capital.

Category III (160 drugs) includes desirable and cheaper drugs (CD) that consume only 10 per cent of the EDE. Since they are desirable drugs their exact requirement should be calculated. These drugs can also be bought in bulk once or twice per annum. If ordered in large quantities for a year, they may be purchased at still cheaper rate .It would save the cost without blocking substantial capital.

The results obtained in this study are comparable to the results obtained in other studies done in the country.[2,5,6,7,8] in various institutions such as Post-Graduate Institute of Medical Education and Research (PGIMER)[7], Government Medical College Hospital (GMCH)[6], Armed Forces of India AFI[2] and Central Government Health Services (CGHS)[8]. This study revealed that our hospital drug formulary contains only 9.67 per cent vital drugs which is much lower than the percentage of vital drugs in the formularies of some other hospitals.[5,6,7]

CONCLUSION

Inventory management should be well planned in order to achieve the lowest possible total cost.. It is impossible to give equal attention to every single drug on the formulary. Therefore, inventory should be classified and prioritized. The matrix derived by coupling ABC and VED approaches can narrow down the number of drugs that need stringent control. ABC and VED analysis of drugs in the hospital drug formulary can help in appropriate use of funds for drug procurement and storage. It would facilitate decision making in purchase and distribution of specific drugs, close supervision on drugs belonging to important categories and effective and efficient management of the hospital pharmacy store, avoiding out of stock situations.

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FIGURE 2
COMPARISON OF VED ANALYSIS OF DIFFERENT STUDIES IN INDIA

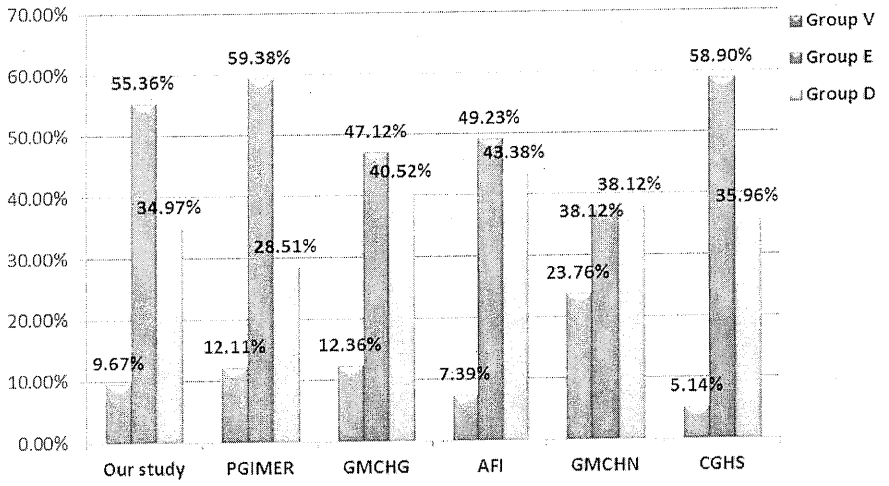
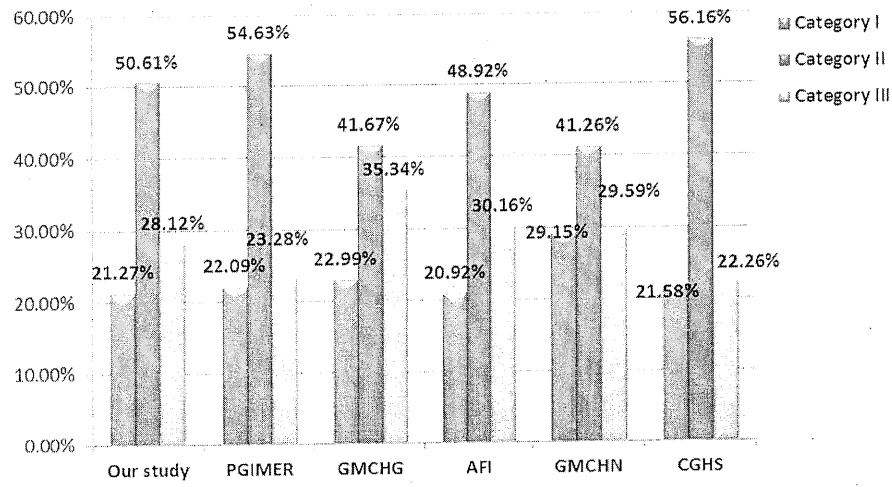


FIGURE 3
COMPARISON OF CATEGORY I, II, III ON ABC-VED MATRIX ANALYSIS OF DIFFERENT STUDIES IN INDIA



In the above figures:
PGIMER- Post Graduate Institute of Medical Education and Research, Chandigarh; **GMCHG**- Government Medical College Hospital, Goa; **AFI**- Armed Forces of India Service Hospital **GMCHN**- Government Medical College Hospital, Nagpur; and **CGHS**- Central Government Health Services.

has declared the 'Newborn Week' observed in the month of November from 15th to 22nd to emphasize the importance of newborn care and create awareness among public as well as professionals. Now the newborn care is included in the Reproductive and Child Health Programme (RCH) to improve the health status of the newborn and reduce the IMR to 35/1000 live births by 2010.[3]

Every birth is a medical emergency. So effective management of newborn babies at birth is essential to prevent many of the causes of neonatal mortality rate.[1] High neonatal mortality rate in our country is the reflection of very poor neonatal care and inadequate training of health professionals in neonatal care.[4]

OBJECTIVES

1. To assess the knowledge of nursing personnel in providing essential newborn care.
2. To assess the practices of nursing personnel in the management of newborns.
3. To find out the association between knowledge and practices of selected factors.
4. To develop a structured self-instructional module on essential newborn care.

METHODOLOGY

An explorative descriptive design of non-experimental approach was used to conduct the study.[5] 40 staff nurses working in labour rooms of five selected Government hospitals in Bangalore have been considred as sample respondents. A non-probability purposive sampling technique was used to select the samples.

Limitations

1. All the five government hospitals engaged in teaching besides other services in Bangalore namely Vani Vilas Hospital, Bowring and Lady Curzon Hospital, Jayanagar General Hospital, KC General Hospital and HSIS Ghoshia Hospital, were included in the study.
2. Nurses working in clean labour room were the samples of the study. Only five clean labour rooms were available at the time of data collection in all the five government hospitals.
3. Only seven to eight nurses were posted in clean labour rooms on rotation basis. Hence, all the 40 nurses were selected as sample respondents.

Findings show that 19 (47.5%) respondents were in the age group of 38-45 years, maximum number of respondents 24 (60%) had their education (till PUC and above), most of the respondents 18 (45%) had 11- 20 years of total service and 18 (45%) had up to 5 years of experience in maternity hospital and 35 (87.5%) nurses had attended in-service education/short-term courses (Table 1).

TABLE 2

FINDINGS RELATED TO KNOWLEDGE SCORES

N = 40

Areas	Statements	Knowledge Score			'F' Test
		Mean	Mean (%)	SD (%)	
Establishment of respiration	14	7.675	54.82	16.7	
Prevention of hypothermia	15	7.875	52.50	16.9	
Establishment of breast feeding	7	4.825	68.93	21.4	4.54*
Prevention of infection	11	6.350	57.73	15.6	
Identification of risk neonates	13	5.899	45.38	17.9	
Combined		54.38	-		

* Significant at P < 0.05% level.

The mean percentage of knowledge score obtained by the nursing personnel in all the five areas of essential newborn care is given in Table 2. The overall mean knowledge score in establishment of respiration was found to be 54.82 per cent, prevention of hypothermia 52.0 per cent, establishment of breastfeeding was 68.93 per cent, prevention of infection 57.73 per cent and identification of risk neonates was 45.38 per cent. It was statistically significant at P<0.05 level (Table 2).

TABLE 3

FINDINGS RELATED TO PRACTICE SCORES

N = 40

Areas	Statements	Practice Score			'F' Test
		Mean	Mean (%)	SD (%)	
Establishment of respiration	3	1.626	54.21	18.0	
Prevention of hypothermia	6	3.326	55.43	13.3	
Establishment of breast feeding	1	0.325	32.52	17.4	5.09*
Prevention of infection	7	5.050	72.14	13.7	

practice (54.21% and 55.43%) scores were almost equal (t=0.16NS and t = 0.86NS respectively). However, significant association was observed between knowledge and practice scores in the areas of establishment of breastfeeding (t = 8.35*) where the knowledge scores were higher (68.93%) than the practice score (32.52%). In the areas of prevention of infection (72.14%) and identification of risk neonates (68.81%) practice scores were higher than the knowledge scores (57.73% & 45.38%) respectively. However, statistical 't' test value was found highly significant (t = 8.35**, t = 4.39**, t=5.31**, respectively), indicating the difference between knowledge and practice scores in these areas (Table 4).

TABLE 5
DISTRIBUTION OF MEAN KNOWLEDGE AND PRACTICE SCORES BY EXPERIENCE

N = 40

Experience	Sample	Response Scores (%)				't' Test
		Knowledge		Practice		
		Mean	SD	Mean	SD	
Total years of service						
Upto 10 years	10	55.2	10.1	63.2	14.5	1.43NS
11-20 years	18	54.2	14.1	63.5	7.0	2.45*
Above 20 years	12	54.4	13.5	57.5	8.5	0.67NS
F – value		0.86NS	1.09NS			

* Significant at P < 0.05% level
NS: Non-significant

The results given in Table 5 show the total service experience and experience in maternity hospitals of the respondents with their Knowledge and Practice scores. 11-20 years of respondents have the highest (63.5%) practice scores than the other groups. However, practice scores among the group was found to be non-significant (F = 1.09 NS). Between knowledge and practice, all groups show that practice score is higher than the knowledge scores. The 't' value of 10 years, and above 20 years of experienced group was found to be non-significant (t = 1.43 and 0.67 respectively) and shows no difference between knowledge and practice components. In the experience of 11-20 years group, 't'-value was found to be significant showing difference in knowledge and practice (t = 2.45* scores) (Table 5).

that as the education level of the respondents increases, higher knowledge (r = +0.2283) and practice (r = +0.2385) are expected. Further, a positive relationship between age and knowledge (+0.0887) was also found. However, age has negative relationship (-0.2445) with practice aspect. Data in Table 7 further show that the overall experience, and experience in maternity hospital has negative relationship with knowledge and practice aspects. It indicates that work experience in maternity hospital is more important than general experience in any hospital.

DISCUSSION

Majority 40 (47.5%) of the nurses were in the age group of 38-45 years and 27.5 per cent of them were in age group of 46-53 years, while 10 (25%) were in 30-37 years of age group.

Majority of nurses 18 (45%) had overall experience of 11-20 years in nursing service and 18 (45%) had 5 years of experience in maternity hospital.

Out of 40 staff nurses, 35 (87.5%) had attended short-term courses, and only 5 (12.5%) of them had not attended.

The overall knowledge of nurses was (54.38%)[5]. Variation and inadequacy of practices were observed in different areas of essential newborn care.[8]

Findings of the study revealed a highly significant impact ($t = 2.99$ at $P < 0.01$ level) between knowledge and practices of nursing personnel. The study also revealed a significant difference between knowledge and practices in the establishment of breastfeeding, prevention of infection and identification at risk neonates in the areas of essential newborn care.[6, 7]

A significant impact was found in the 38-45 years of age group ($t=2.42$, at $P <0.05\%$ level), education (PUC and above), ($t = 2.09$, at $P < 0.05\%$ level), professional education (General nursing and midwifery course) ($t = 2.60$ at $P <0.01\%$ level), Designation - (Staff nurses) ($t = 2.77$, at $P <0.01\%$ level), Total years of experience (11-20 years) $t = 2.45$, at $P <0.05\%$ level). Experience in maternity hospital (6-15 years), (t-2.25 at $P <0.05\%$ level).[9]

The knowledge and practices of short-term course attended ($t = 3.60$, at $P <0.01\%$ level), shows a significant difference and positive influence of teaching programme or short-term courses / training in care of the newborn in knowledge and practices of nurses.[6, 7, 10]

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