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Individual Predictors of Healthcare Research Utilization: A case of Arua District Local Government, West Nile Uganda

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Abstract

Despite increasing knowledge of potential benefits of research utilization in improving quality of healthcare management decision (HMDs) outcomes and practice, the use of research evidence by healthcare authorities continues to be a global concern. We examined individual predictors of research utilization in management decisions of healthcare authorities in a local government's context of Arua district in West Nile Uganda. The observational cross-sectional survey design was used, involving 225 questionnaires and nine key informant interviews, and the extent of influence of individual variables on research uptake was determined by estimation of predicted probabilities, and the corresponding odds ratios and coefficients using the binary logistic regression model. The results reveal that research utilization was significantly influenced by individual characteristics, whose overall predicted probability was 0.030 ($p<0.05$) with attitudinal variables being most significant, whereby belief in research-based HMDs ($p= 0.020$) or improved quality of HMDs ($p= 0.012$) recorded high corresponding odds ratios. Hence, the study substantiates the multifactorial nature of research utilization, being influenced to varying extents by individual factors, and emphasizes attitudinal change, information sharing and capacity building to increase uptake.

Key words: *Research utilization, individual characteristics, research evidence, healthcare authorities, and healthcare management decisions.*

Introduction

Rooted in evidence-based practice (EBP) that involves integrating best research evidence with clinical values and patient values (Sackett et al., 2000), research utilization is a specific type of knowledge utilization (Estabrooks, 1999) that involves transforming study findings into one or more forms of research use, categorized generally as instrumental, conceptual, persuasive or overall. The definition of research utilization is adapted from Sackett et al. (1996, 71) "the conscientious, explicit, and judicious use of current evidence in making decisions about the care of individual patients". The process of utilizing research evidence entails six major steps (Barends et al., 2014) namely; translating a practical problem into answerable questions, systematically searching and retrieving available evidences, critically appraising the evidences for quality, pulling together all relevant evidences, putting to decision action the best evidence, and finally evaluating the decision outcomes.

The motivation is that the use of best research evidence increases quality of healthcare management decision outcomes and practice (Stevens, 2013). To affect better patient outcomes, new knowledge from research must be transformed into clinically useful forms, effectively implemented across the entire healthcare systems context, and measured in terms of meaningful impact on performance and health outcomes (Stevens, 2013). Nonetheless, research evidence use continues to be a global concern, with considerable difficulty in implantation (Amanda et al., 2009) with respect to field practice.

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Pfeffer and Sulton (2006) admit that though thousands of studies are conducted every year, little appears to be utilized, with only about 15% of all management decisions take into account scientific evidence whilst the rest are made absolutely on basis of obsolete knowledge gained in school, traditions, experience, beliefs or other sources of information. Likewise, Melnyk et al. (2012) agree that research evidence use remains slow and unpredictable, or even worse among managers, whom according to Fraser and Clancy (2007), and Pfeffer and Sulton (2006) have been much slower, more-so in developing countries where efforts to promote evidence-based management has faced greater challenges.

In short, there is a significant research use gap (Swan et al., 2012) yet only very few studies have investigated the problem in developing countries. Among these include; the qualitative studies by Albert, Fretheim and Maiga (2007) in Mali, Orem et al (2012) and Nabyonga et al. (2012) in Uganda, and Ongolo-Zogo, Lavis and Tomson (2014) in Uganda and Cameroon, which also lamented of lower than expected research uptake. Even though, none of those studies quantified the extent to which individual variables influenced research utilization, or examined the influence in a decentralized local governments' context.

Hence, the present study investigated the extent of influence in both qualitative and quantitative perfectives in Arua district local government, West Nile Uganda. It was anticipated that the findings would be useful not only to the local healthcare authorities but also to research and academic institutions in Uganda and beyond. The findings would help these stakeholders in making better informed decisions for increasing future uptake of research, educate and create awareness, and inform future programming so that research becomes better appealing to users, in order to maximize the benefits accruing from action research. So, these would eventually translate in informed healthcare practices and policies for quality health service delivery to the populace. In summary therefore, not narrowing the research-practice gap would lead to poor health service delivery since no new innovations would be trickling into practice, which in-turn has the potential of affecting the lives of other people globally, aware that diseases respect no borders, more-over there was influx of refugees from DRC and south Sudan.

Methodology

A combination of quantitative and qualitative research approaches were used based on the observational cross-sectional survey design, in which a total of 245 questionnaires were self-administered to eligible healthcare managers (HM), healthcare administrators (ADM) and political leaders in 10 out of 29 clustered sub counties in Arua district local government. The questionnaire survey was supplemented with nine key informants' personal interviews.

To arrive at 10 as the number of clusters to which to concentrate the study, first, the average size of the clusters (24.5 healthcare authorities) was determined by dividing the total number of healthcare authorities (712) in the study area by the 29 clusters. The study sample size was then divided by the average cluster size (i.e. 245/24.5), thereby giving 10 as required number of clusters in which to focus the study. The 10 clusters (Arua Hill, Vurra, Logiri, Rhino Camp, Ogoko, Okollo, Pajulu, Aiivu, Ajia & Oli River) were selected by the simple lottery random sampling method (Amin, 2005) by putting all 29 clusters in a non-transparent bag, then blindly picking one by one each time until reaching the desired number of clusters.

At cluster level, purposive sampling method described by Kothari (2005) and Amin (2005) was then used. The method involved selecting respondents from each sampled cluster based on known roles in making healthcare management decisions so as to allow a fair representation (Amin, 2005) of all categories of study population. In short, all healthcare mangers, administrators and political leaders in the sampled clusters were eligible to participate. Support staff like drivers, cleaners and interns were not eligible to participate because they have minimal roles in making healthcare management decisions in their work place.

Questionnaire data was entered in SPSS, cleaned and exported to Stata for statistical analysis. First, descriptive univariate analysis for frequency distributions and percentages was done for each explanatory variable. Multivariate analysis using the binary logistic regression model (Gurarati, 2004) was then done to estimate the odds ratios, as an indicator of the extent to which each regressor influenced research utilization,

while the predicted probability (Prob > chi2) reflects a measure of the overall significance (Gurarati, 2004) of the influence.

In this study, we examined the influence of the following individual predictors of research utilization; Educational level, professional characteristics (specialty, experience), attitude (intent to use research & perceptions about research), research participation, literacy training, information seeking, and Socio-demographic factors (Age & Gender). The following structured binary regression model was run:

$$RU_i = \left(\frac{P_i}{1-P_i}\right) = B_1 + B_2\text{AGE} + B_3\text{GEN} + B_4\text{EDU} + B_5\text{SPE} + B_6\text{PART} + B_7\text{RELIT} + B_8\text{ATTD} + u_i,$$

whereby:

- L_i is the logit whose P_i is the predicted probability; B_1 is the regression slope intercept.
- B_2 is the odds that RU was influenced by age of the respondents.
- B_3 is the odds that RU was influenced by gender.
- B_4 is the odds that RU was influenced by educational level of the respondents.
- B_5 is the odds that RU was influenced by specialty of the respondents.
- B_6 is the odds that RU was influenced by research participation.
- B_7 is the odds that RU was influenced by research literacy training.
- B_8 is the odds that RU was influenced by attitude.
- u_i stands for the error term, which accounts for the factors not included in the model

In contrast, qualitative interview data was examined using the content analysis technique (Holsti, 1969) that involves systematically and objectively identify special characteristics of verbal statements, coding them into categories or themes, and then summarizing the data into meaningful texts and verbatim quotations.

Findings

Sample characteristics and response rate

Overall, a total of 225 out of 245 questionnaires were returned completed, but two were excluded from statistical analyses because the respondents were interns, and therefore illegible to participate in the study. We summarized in **table 1**, the proportions of category of respondents.

Table 1. Number of respondents attained and corresponding response rate against the target

Category of Respondents	Target	Actual	Response rate (%)
Healthcare managers	158	146	92.4
Healthcare administrators	40	35	87.5
Political leaders	47	44	93.6
Total	245	225	91.2

Source: Primary Data.

The response rate for each target category of respondents was ≥ 87.5%, with an overall rate of about 91.2%, far higher than the minimum acceptable 60% (Fincham, 2008), which implies that the sample was a fair representation of the study population. In addition, nine key informants were interviewed successfully, against the initial target of eight interviewees. Eight of these were healthcare managers, while one was an administrator. Efforts to interview political leaders were not successful because they were engaged in electoral campaigns. We have presented in **table 2** below, the demographic information of the questionnaire respondents.

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Table 2. Descriptive statistics for respondents' background demographic information

Variable	Category	Frequency	% of respondents
Gender	Male	127	56.4
	Female	98	43.6
Age brackets	18-25 years	22	9.8
	26-34 years	79	35.1
	35-43 years	58	25.8
	44-52 years	44	19.6
	53-62 years	21	9.3
	Over 62 years	1	0.4
Education level	Ordinary level certificate	30	13.3
	Advanced level certificate	14	6.2
	Professional certificate	71	31.6
	Professional diploma	65	28.9
	First degree	21	9.3
	Postgraduate diploma	11	4.9
	Master's degree	9	4
	Primary leaving certificate	4	1.8
Job specialty of respondents	Administrator	35	15.6
	Doctor	2	0.9
	Clinician	19	8.5
	Laboratorian	18	8
	Nursing/midwifery	78	34.8
	Politician	44	19.6
	Health Assistant	6	2.7
	Environmental Health	1	0.4
	Others	21	9.4
Maximum number of years	0-4 years	80	35.7
	5-9 years	48	21.4
	10-14 years	32	14.3

worked in the specialty job area	15-19 years	26	11.6
	20-24 years	24	10.7
	25-29 years	11	4.9
	Over 29 years	3	1.3

Source: Primary Data.

Majority of the respondents were male (56.4%), though with only a marginal difference of about 12.8 per cent. Stratification of respondents by age groups shows that about 44.9 per cent of them were youth (18-34 years of age). Hence, 57.1 per cent of the respondents had less than 10 years' specialty experience, with those possessing over 25 years constituting only 6.2 per cent.

Regarding educational level and job specialty, just over 60% of the respondents attained either a professional certificate (31.6%) or a diploma (28.9%), and a significant proportion (21.3%) had less than a professional certificate. These results correspond with further finding that majority of the respondents were nurses (34.8%), followed by politicians (19.6%), with doctors constituting less than 1%. While these results indicate a general shortage of doctors, they would not suggest dominance by under qualified personnel since the local government minimum entry credentials for low cadre staff (nurses, health assistants & technicians) is a certificate, and a diploma for clinicians, but can be as low as a primary level education for political leaders. In contrast, all the key informants were male, which suggests that men dominated higher occupational hierarchies in Arua district than their female counterparts. One of the interviewees was a political scientist, senior nursing officer (1), principal medical officers (2), senior clinical officer (1), senior medical officers (2), and medical officer (1), all of whom had attained at least a post graduate diploma, and accumulated specialty experience ranging from 7-15 years.

Research participation

Table 3 below shows respondents' participation in healthcare research in their workplace in the last two calendar years, frequency of participation, type participation, and how they participated.

Table 3. Descriptive statistics for respondents' participation in healthcare research

Variable	Category	Frequency	% of respondents
Participation in healthcare research	Never Participated	121	53.8
	Participated at least once	78	34.7
	Participated Always	26	11.6
Type of healthcare research participation	Clinical trials	19	22.9
	Evaluation of diagnostic tests	15	18.1
	Demographic health surveys	47	56.6
	Rodent control studies	12	14.5
	Flea control studies	13	15.7
How respondents participated in healthcare care research	Designing/developing the research	29	29.6
	Reviewing the research design	25	25.5
	Approving the research	8	8.2
	Training research participants	20	20.4
	Collecting data	74	75.5
	Enrolling participants/patients	34	34.7
	Analyzing research data	38	38.8
	Giving feedback to study participants	29	29.6

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	Giving feedback to community members	13	13.3
	Attending dissemination workshop	27	27.6
	Publishing findings	12	12.2

Source: Primary Data.

A higher proportion of respondents (53.8 %) had never participated in healthcare research in their work place in the last two calendar years. Among those who participated in at least one (34.7%) or participated always (11.6%), majority (56.6%) participated in demographic surveys, with data collection (75% of all cases) recording the most common type of participation.

Additional types of research participation reported by the key informants were baseline surveys and disease prevalence studies. According to the informants, their participation included one or more of the following ways; providing authorization or introduction letters, attending inception workshops, attending dissemination workshops, acting as entry point for researchers, being respondents, enrolling patients and collecting data. Besides, one informant reported that he participated in reviewing a research protocol. However, with respect to level of participation, some of the informants had this to say.

No, not adequate at all, I would like to participate better than this, not simply as a respondent or an entry point for researchers (HM1); our participation in most cases has been in providing authorization to researchers, we are hardly engaged in the initial design, identifying the problem or in reviewing protocols (ADM).

The informants generally felt that their participation was not adequate as reflected in the above verbatim quotations. According to them, participation is adequate if they are engaged in all major research activities. To substantiate this, some informants lamented that,

In most cases, research is designed from the top with no or little input of end users, most which come as donor driven projects that may not match real pressing needs (HM2); we only get to know about the research at implementation stage, but if you come and identify a problem in my house without involving me, how would you expect me to own it? (HM1); self-initiated research is very few in my workplace, I have not come across one, research always appears imposed upon us (HM4).

The above verbatim statements imply that the informants preferred a bottom- top to a top-bottom research design approach because it allows them to participate in identifying and analyzing the problem, as key stage in ensuring that the research addresses the real needs. In short, it is eminent that research participation was not adequate, a situation that could potentially impede ownership and use of findings. In fact, one informant expressed fear in trusting results from research that they never participated in.

Research literacy training, knowledge and skills

The study reveals that majority (70.1%) of respondents had not attended any research literacy training in their workplace in the last two years. Even those who said they attended (29.9%) made inference to the research methodology module while still in college, or research inception or design meetings and workshops. Similarly, the informants indicated the same. With respect to their level of knowledge and skills in research utilization, **table 4** shows the findings.

Table 4. Descriptive statistics for respondents' research utilization knowledge and skills

Variable	**Percentage of respondents**			
	Knows nothing and lacks practical experience	Knows some theory but lacks experience	Knows some theory, had some practical experience, but have not yet mastered	Knows quite a lot and needs no assistance
Translating problem into answerable questions (N=225)	2.89	30.2	36.4	3.6
Searching & retrieving evidence (N=224)	38.8	32.6	25.0	3.6
Critically appraising evidence (N= 225)	41.8	33.3	22.2	2.7
Weighing evidences (N= 224)	35.5	35.5	24.6	4.4
Applying best evidence (N=223)	28.7	29.6	34.5	7.2
Assessing the decision-outcome (N= 225)	31.6	34.7	28.9	4.8
Communicating evidence to audiences (N=225)	23.1	33.8	36.0	7.1

Source: Primary Data.

With exception of the category "*I know quite a lot and needs no assistance"*, whose responses were all below eight per cent, the proportions of respondents in other three categories were very similar and ranged from 22.2% to 41.8%. On average, only 4.8 % of the respondents knew quite a lot and needed no assistance. This was about seven times lower than those who knew nothing and lacked practical experience or knew some theory but still lacked practical experience. These results were consistent with those from the key informants, who for example had this to say.

Indeed, I sometimes have reservations on findings of some of the researches undertaken around us; as per now, our human resource capacity is very low to get good research outcomes from our laboratories; people sometime shun wrong out results, for instance, in a number of cases, diseases like malaria appear to be misdiagnosed; actually, a research was done recently to show that we have a lot of errors from our laboratories, making it quite difficult to rely on health researches like clinical trials undertaken in our local laboratories, more-over the clinicians too in many cases order for wrong investigations (ADM).

Information sources

Here **(table 5)** we present results on sources of information used by the healthcare authorities when making healthcare management decisions in their workplace.

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Table 5. Descriptive statistics for respondents' information sources

Variable	% of respondents		
	Never	**Rarely**	**Frequently**
Interacting with patients (N=225)	7.1	50.6	42.2
Personal judgment of what works best for me (N=225)	12.9	54.7	32.4
Information learnt while in school (N=225)	5.4	46.7	48.0
Text books or library (N= 224)	8.1	69.6	21.9
Online journal publications (N=225)	22.7	68.0	9.3
Newspapers (N= 225)	12.0	76.4	11.6
Magazines (N= 225)	17.4	76.0	6.7
Bulletins or leaflets (N= 225)	14.7	69.8	15.6
Interacting with colleagues or peers (N=225)	13.8	70.2	16.0
International conferences or workshops (N=225)	41.4	50.2	8.4
National conferences in Uganda (=225)	25.8	60.0	14.2
Local conferences in Arua (N=224)	8.0	67.0	25.0
Task force or committee meetings (N=225)	16.5	64.0	19.6
Standard guidelines or protocols (N=225)	12.8	39.1	48.0
Experts or consultants (N=225)	13.8	64.0	22.2

Source: Primary Data.

The table shows guidelines or protocol and information learned from school were commonest sources of information for making healthcare management decisions. These were followed by interacting with patients, while online journals, magazines and international conferences were ranked among the least used information sources due to accessibility challenges.

Research Attitude

Table 6. Descriptive statistics for respondents' research attitude

Variable	% of respondents		
	Disagree	**Neither agree nor disagree**	**Agree**
Research adds credibility to HMDs (N=225)	4.9	2.7	92.4
Research leads to improved quality of HMDs (N=225)	3.4	1.0	95.6
HMDs should always be based on research (N=225)	11.6	10.5	77.9
Willingness to use research findings when making HMDs (N=225)	4.1	6.7	89.2
I use research findings when making HMDs in my workplace (N=225)	11.1	21.0	67.9
Willingness to use research findings to influence HMDs (N=225)	4.5	4.8	90.7
I use research findings to influence HMDs in my workplace (N=225)	9.8	21.1	69.1
Willingness to use research findings even if it contradicts something learned from school years ago (N=225)	16.9	17.8	65.3

Research findings have had considerable influence on HMDs in my workplace (N=225)	10.2	18.2	71.6
Research findings have had moderate influence on HMDs in my workplace (N=225).	35.0	26.5	38.5
Research findings have had limited influence on HMDs in my workplace (N=225)	54.2	20.0	25.8
Despite the relevance research, there is no indication of its influence on HMDs in my workplace (N=225)	68.5	11.1	20.4

Source: Primary Data.

The respondents expressed more positive attitude towards research, with over 90 per cent agreeing that research adds credibility and leads to improved quality of HMDs, while 77.9 percent agree that HMDs should always be based on research findings. Nonetheless, "willingness to use research" was much higher than "actual research use". Respondents who agree that they use research evidence when making HMDs (67.9%) were only about 1.2 per cent less than those who use research evidence to influence HMDs in their workplace. Notwithstanding, a lower proportion of the respondents (65.3%) agree that they were willing to use research evidence even if it contradicted something they learned way back from school. These discrepancies suggest some level of skepticism among the healthcare authorities.

Majority (71.6%) agree that research had considerable positive influence on HMDs in their work place. This is consistent with the majority (68.5%) who disagree that there was no indication of research's influence on HMDs. The importance of research was indeed underscored by the key informants to, who accentuated that they use research to validate their HMDs and performance. However, one informant warned that;

Research is still perceived as an alien thing, an end-point in itself, which does not go beyond dissemination (ADM).

This implies that a section of the healthcare authorities was not yet familiar with research, and that they viewed research as stopping at disseminating findings, requiring no actions thereafter, yet the process needs to go beyond dissemination, to implementing the findings and evaluating outcomes.

Regression results

The relative significance of individual factors in influencing research was tested using the Binary Logistic regression model, whose results are summarized in **table 7** that follows here-in.

Table 7. Binary Logistic Model results on individual characteristics and research utilization

Variable	Odds ratio	Coefficient	p-value
GENDER	1.255	0.227	0.546
AGE			
26- 34 years	0.522	-0.650	0.326
35- 43 years	0.496	-0.702	0.354
44- 52 years	0.663	-0.411	0.633
53- 62 years	0.694	-0.365	0.731
EDUC. LEVEL			
Advanced certificate	2.150	1.296	0.165
Professional certificate	3.653	0.765	0.273
Professional diploma	3.463	1.242	0.070
First degree	3.313	1.198	0.152
Post graduate diploma	1.850	0.615	0.538
Master's degree	2.490	0.912	0.469
SPECIALTY			

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Clinicians	0.191	1.654	0.030
Laboratorians	0.933	-0.070	0.935
Nursing	0.470	-0.755	0.261
Politicians	1.280	0.247	0.751
Health Asst.	0.170	-1.772	0.129
EXPERIENCE			
5- 9 years	1.051	0.499	0.918
10- 14 years	3.243	1.176	0.080
15- 19 years	1.073	0.070	0.924
20- 24 years	2.177	0.778	0.341
25- 29 years	2.747	1.010	0.382
Over 29 years	0.439	-0.822	0.607
PARTICIPATION	1.982	0.444	0.314
RESEARCH LIT TRAINING	2.138	0.760	0.109
ATTITUDE			
Increased credibility of HMDs	0.449	0.800	0.248
Improved quality of HMDs	4.263	1.450	0.012
Research-based HMDs	5.540	1.712	0.020
N	214		
LR Chi2 (28)	43.66		
Pseudo R2	0.161		
Prob > Chi2	0.030		
Log Likelihood	-113.442		
Goodness-of-fit	0.0299		

Source: Primary Data

The coefficient for gender was positive, with a corresponding p-value that is statistically insignificant since it is higher than 0.05 at 95% confidence interval. The odds ratio in respect to gender indicates that male respondents were as likely as the female counterparts to utilize research. Hence, gender had no significant influence on research utilization. In contrast, the coefficients for age brackets were all negative, with corresponding p-values that are statistically insignificant ($p>0.05$). The odds ratios in respect to age of respondents were very small (less than 1unit), indicating that age had no significant influence on uptake.

Regarding educational level, the coefficients were all positive, with corresponding p-values that are statistically insignificant ($p>0.05$). The odds ratios in respect to educational level indicate that respondents who attained a professional certificate, professional diploma or first-degree credentials were equally likely (over all three) to use research. Hence, educational level had no significant influence on research utilization in HMDs of the healthcare authorities. With exception of being politician or clinician, whose coefficients were positive, the coefficients for other categories were negative, with corresponding p-values that are statistically insignificant ($p>0.05$), apart from clinicians where the p-value was less than 0.05, implying that being a clinician had significant influence on research use though its odds ratio was very small.

Although all coefficients for experience were positive, the corresponding p-values were statistically insignificant ($p>0.05$). However, the model indicates that respondents with 5-14 years' experience were over three times more likely to use research findings. Unfortunately, this category represents only 14.3% (section 4.3) of all represents. Further, while the p-value for participation was statistically insignificant ($p>0.05$), the model indicates that respondents who participated in healthcare research in their work place

were about two times more likely to utilize evidence. More still, the model indicates that respondents who attended research literacy training were more than twice likely to use evidence than those who did not attend, though this variable had no significant influence on uptake since its p-value was higher than 0.05.

Finally, among attitudinal variables tested in this study, positive belief that HMDs should always be based on researched evidence (p= 0.020) and that research leads to improved quality of HMDs (p= 0.012) had significant influence with an odds ratios as high as five times and four times respectively. Since the overall significance of influence of individual factors, as given by the predicted probability (Prob > Chi2) was 0.030 ($p<0.05$), implying that at 95% confidence interval and all other factors constant, individual characteristics significantly influenced research utilization in HMDs of the healthcare authorities. The null hypothesis that individual characteristics did not significantly influence utilization was therefore rejected.

Discussion

Generally, individual characteristics significantly influenced research utilization in HMDs of the healthcare authorities. This is consistent with other reports for healthcare providers as observed in a number of previous studies such as those by Estabrooks et al. (2015), Squires et al. (2011) and Doran et al. (2012) in developing countries. Like the present study, those studies examined a range of individual level predictors of research utilization, including gender, age, educational levels, job specialty, specialty experience, research participation, information seeking, research literacy training, and attitude towards research. The discussion that follows in this subsection therefore focuses on the listed variables above.

First, the difference in the proportions of male (56.4%) and female (43.6%) respondent recorded in this study would be expected, considering the prevailing gender disparities. This finding is consistent with other studies. For instance, a recent study by Constance (2013) reported that the healthcare workforce in Uganda was dominated by men, who occupy about 63% of middle and 100% of all the senior management positions.

In Arua district, where the present study was undertaken, the Constance's study observed that up to 50% of all healthcare positions in the salary scale U3 were occupied by men, who dominate the medical and clinical fields, while women dominate nursing and midwifery. Nonetheless, the dominance of male healthcare workers over their female counterparts had insignificant influence on research utilization, as revealed by the present study, which substantiates previous studies by Squires et al. (2013) and Estabrooks et al. (2015) that also reported insignificant relationships between gender and research use. Likewise, Estabrooks (1999) in her earlier modeling of individual determinants of research utilization reported similar results.

Similarly, the insignificant influence of age on research utilization in HMDs of healthcare authorities observed in the present study is consistent with evidence in literature where Estabrooks et al. (2003), Cummings et al. (2007), Squires et al. (2011) and Squires et al. (2013) also reported no association of age with research use in in developed countries. These results however conflict with recent findings by Estabrooks et al. (2015), in which age significantly influenced best practice use in Canada, as such; additional research may be needed in the developing world context.

With respect to influence of education, the observation from the present study is consistent with empirical studies by Kenny (2005), Connor (2007), Squires et al. (2013) and Estabrooks et al. (2015), which also reported insignificant relationships between increasing levels of education and research use in developed countries like Canada and United States of America. Even so, Squires et al. (2011) in their systematic review of individual determinants of research utilization noted that 57% of studies they reviewed reported positive significant relationships between higher levels of education and research use, prompting them to make a conclusion that utilization increases with increasing levels of education. Instead, this study suggests that utilization was more likely to me higher among professional certificate or diploma holders than graduate and post degree holders, as reflected by the higher odds ratios in those respondents with professional certificates and diplomas.

In fact, possession of a professional diploma, whose corresponding p-value was 0.070 ($p<0.05$) significantly influence research utilization in Arua district local government, as opposed to Squires et al.

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(2011) who instead reported positive significant relationships among higher degree holders. This inconsistency may be due to the fact that the more qualified healthcare authorities in Arua district local government; occupy higher hierarchal positions, getting more engaged in administrative managerial roles than science work. This argument is indeed supported by Pfeffer and Sulton (2006) that administrators and senior managers were less likely than scientists to utilize research.

In the context of this research, majority of healthcare personnel with the professional diploma credential were young clinical officers in the early stages of advancing their health careers. This may explain the consistency in possession of a professional diploma and the clinical specialty, which both had significant influence on research utilization in Arua district local government. With exception of Estabrooks (1999) who earlier reported no association, and Squires et al. (2007) who reported negative significant association, at least five of the studies reviewed by Squires et al. (2011) reported positive significant relationships between clinical specialty and research utilization in developing countries. Nonetheless, the corresponding odds ratio with respect to clinical specialty observed in the present study was very small, which tends to lean this result towards the general conclusion there is no significant relationship between job specialty and research use (Squires et al., 2013). Hence, further research is required to investigate the relationship between job specialty and research utilization.

On specialty experience, the results from this study are consistent with those from the systematic review by Squires et al. (2011), in which they concluded that none of the studies they reviewed reported a statistically significant relationship between specialty experience and research utilization. However, their review was focused on nursing and limited to work published in the selected languages, which prompts this study to recommend further empirical investigations of the influence of job specialty on research utilization, more-so in developing countries.

Research participation is yet another individual attribute explored in the present study. Whereas it appears logical for research uptake to be higher among healthcare authorities who participate in research, as the case reported by Tsai (2000) in China, the statistically insignificant results presented in the present study underpins evidence from other studies such as by Tranmer et al. (2002) and, Milner et al. (2005) that involvement in research has no significant influence on uptake. However, it is perhaps important to note that these two studies used the word involvement, not participation, terms that have often been in literature interchangeably.

Nonetheless, key informants in this study emphasized the need for adequate participation of all relevant stakeholders in all stages of research so as to increase the use of findings. Likewise, Sudsawad, (2007), Thompson et al. (2007), Fraser & Clancy (2007), Orem et al. (2012), and Mbonye and Magnussen (2013) underscored the importance of stakeholders' participation in research because it harnesses ownership and sustainability. On these grounds, the present study recommends increased research participation of stakeholders and further research to validate its influence on research use, considering that Estabrooks et al. (2003) and Squires et al. (2011) desisted from making conclusions on influence of participation, due to limited number of empirical studies in the area.

With regard to research literacy training as an individual characteristic, it sounds logical that training would increase uptake as the odds ratio suggests. Nonetheless, the statistically insignificant influence observed in the present study was consistent with that from Squires et al. (2013). Even though, the informants strongly emphasized the need for human resource capacity building as a measure to increase research utilization. Likewise, Lansang and Rodolfo, (2004) underscored the importance of capacity building. On these grounds, this study recommends funders to support routine on job research literacy training for healthcare authorities.

Lastly, the findings from the present study adds voice to known literature about attitude being the most statistically significant predictor of research utilization, as reported previously by Fraser and Clancy (2007), Estabrooks et al. (2003), Squires et al. (2011), and even more recently by Estabrooks et al. (2015). Fraser and Clancy (2007) stressed that progress depends on attitude changes. In fact, two out of the three attitudinal variables explored in this study significantly influenced research utilization, with odds ratios which were

as high as over five times. During the interviews, one informant stressed his love for research, and that whenever he encounters research, he feels at home. We think that these were very strong attitudinal sentiments that could positively influence research uptake, the reason we strongly recommend attitudinal change so as to increase research utilization among healthcare authorities.

Conclusion

This study shows that, overall, individual characteristics had positive significant influence on research utilization, with attitudinal variables having highest odds ratios, which implies that they have strongest positive influence on research use, and as such, individual level-based measures to increase research uptake should focus on creating positive attitudes towards research. Hence, our findings reinforced conclusions in previous studies with respect to individual characteristics (beliefs and attitude) having strongest influence on research use in health settings.

Since attitude was the most significant individual factor, with respect to influencing research utilization by the healthcare authorities, an observation that is well supported in literature, we recommends that measures to increase research use should focus on attitudinal change, targeting more-so the leadership so that they take stewardship in using research as an important tool for informing decisions in their workplace. We also recommend the urgent need for researchers to invest in a holistic capacity building approach that carefully balances the aspects of human resource, equipment and infrastructural developments so as to harness continuity and ensure sustainability of research interventions. Also, the fact that most previous studies were conducted in the developed world and that this study focused in only one district, there is need for additional studies to be replicated in other areas.

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