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Chigozie Simeon Ugwuona Dr.

National Institute for Pharmaceutical Research and Development, Idu Industrial Area, Abuja Nigeria, chigozie246@gmail.com

Virginia Winsell Dike Professor

Department of Library and Information Science, University of Nigeria, Nsukka ,, vwdike@yahoo.com

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Relationship between Library Resources and Research Productivity in Five Nigerian Health-based Research Facilities

By

1. Chigozie Simeon Ugwuona, *PhD*

National Institute for Pharmaceutical Research and Development, Idu Industrial Area, Abuja Nigeria, chigozie246@gmail.com +2347030132056.

2. Virginia Winsell Dike, *Professor*

Department of Library and Information Science, Faculty of Education, University of Nigeria, Nsukka, vwdike@yahoo.com +2348035664021

Abstract

The study of the relationship between library resources and research productivity in five Nigerian health research facilities was conceived majorly to investigate the relationship existing between these two variables. The study employed a descriptive survey design to undertake a population of 198 research staff in the five research centres (out of this number, 166 were actually used). Questionnaire and observation check list were used to collect data which were presented in tables and analyzed using descriptive statistics. The Pearson Product Moment Correlation coefficient (r) was applied to determine the relationship while hypothesis was tested with t-statistics at 0.05 probability level. Results show that productivity of the research staff met the benchmark established in their conditions of service. These were 1, 641 publications as against 1,307 expected from all the population studied. The major productivity predictor is journal articles and this cut across all the centres. The study also showed that there was a positive but non-significant ($P > 0.05$) relationship between print resources ($r = 0.012$) and non-print resources ($r = 0.038$) and research productivity in the five health research centres covered.

Key words: *Research productivity, Library resources, Health research, Nigeria, Productivity predictor, Health information*

Background

Research results from health/medical science sector have generally revolutionized peoples' approach to public health. The World Health Organization (2006) reported that such research has led to dramatic improvements in health worldwide hence, the need for more intensive health research since disparities and inequities in health, remained major development challenges of our time.

Research, whether basic or applied in nature, has relevance in human society. It helps to solve professional problems, develop tools and methods for analysis of organizations, services and behaviour. Its ultimate benefit lies not only in the generation of new knowledge but in the translation of such knowledge into technologies, interventions and strategies effectively and appropriately delivered to the needy. Presently health science research processes are being pursued within the context of contemporary knowledge, good ethics, effective policy, adequate resources and international cooperation. Thus, advances in health science research and scientific knowledge have brought about development and also led to the discovery of medicines, vaccines, diagnostics and medical devices that have improved health worldwide (Lansang and Dennis, 2004). In all these, the library has a central role of providing information resources for the conduct of research.

Establishment of institutes in Nigeria started during the colonial period (Aluko-Olokun, 1999; Barrow, 2002) when the National Department of Veterinary Research, Vom, was set up in 1924. This is known today as the National Veterinary Research Institute (NVRI), Vom. The Nigerian Institute for Trypanosomiasis Research (NITR) came up in 1947 as West African Institute for Trypanosomiasis Research (WAITR) with its headquarters located in Kaduna (Obaka, 1985). Its research interest was in African Trypanosomiasis and Onchocerciasis.

According to him, the establishment of Nigerian Institute for Medical Research (NIMR), Lagos in about 1977, was also possible because of the presence at Yaba- Lagos, of the Yellow Fever Commission of the International Health Division of Rockefeller Foundation of New York. Other similar health-based research institutes came in later and these include the National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, established in 1989 as a result of an agreement between the Federal Government of Nigeria and the Pharmaceuticals Manufacturers' Group of the Manufacturers' Association of Nigeria (PMG-MAN). The institute has interest in drug development and formulary. The fifth under study is the Nigeria Natural Medicine Development Agency (NNMDA), Lagos, established in the late '90s to actualize the critical and strategic mandate of researching, developing, documenting, preserving and promoting Nigeria natural medicines, defined as traditional (indigenous) health care systems, medications and non-medication healing arts with a view to integrating these into the nation's national health care delivery systems. These research facilities like similar ones have major functions of initiation and coordination of research programmes, provision of research requirements and management of human and material resources (Kibua and Oyugi, 2005)

The research libraries of these centres are established with the desire for meeting the information needs of researchers in the research and development (R & D) mandates of the organizations. The relevance of the resources of these libraries is tied to their contents. However, the resources are usually in form of print and non-print including the traditional tools and the modern information and communications technology facilities useful for information synthesis, dissemination and storage. How these research centres and their libraries are able to perform in research activities determines their rating, with special emphasis on the productivity

of the staff who are expected to progress in rank by evidence of peer reviewed publications or other products bearing intellectual input.

Argyris (2005) showed that number of publications in peer reviewed journals could be an accepted measure of research productivity, especially in an academic environment. In these five research centres, productivity is considered by factors like number of products on shelf, number of registered patents and also publications communicated in peer-reviewed journals. Although, acceptable standard for productivity differs from one work station to another, organizations that perform similar jobs and have a near similar mandates could be adjudged with same and equal standards for productivity. Thus for the centres under study, the standard in use (FMOH-NIPRD, 2010) applies here. These are categorized according to ranks of staff which appear in seven categories as follows: Research Assistant – Nil; Junior Research Fellow- 2 publications; Research Fellow II- 4 publications; Research Fellow I- 10 publications; Senior Research Fellow- 15 publications; Associate Research Professor/Deputy Director- 20 publications and Research Professor/Director- 30 publications.

In Nigeria, local standards for library resources are difficult to come by but the accreditation criteria for libraries in tertiary institutions were found helpful. Generally, the standard now (as used by the National Commission for Colleges of Education) is: 10 numbers of books per user (to cover all areas of subject), three (3) titles of periodicals per user and one percent (1%) of total print collections in place of the non-print materials. These standards apply in this work.

Statement of the problem

A good number of health researchers and health care administrators recognize the importance of information to excellent and value-added research results. It is assumed that technical information available in these resources would aid researchers through their research

activities by providing information that would contribute positively on research initiatives and findings and as well enhance general productivity of both the researcher and the organizations.

But there is an unattended gap in library science research about identifying the relationship of library resources and research productivity in the research institutes in Nigeria. Thus, the problem being investigated is to examine the existing relationship between library resources and research productivity in the health research facilities presented above.

Purpose of the study

The purpose of this study is to determine the relationship existing between library resources and research productivity in five Nigerian health research facilities. Specific objectives are: To investigate the available library resources for health research activities in these facilities; To determine the extent of research productivity in these facilities; To discover the major predictor of productivity in these research facilities, and; To establish the relationship between library resources and research productivity in them.

Research questions

The following questions were framed to guide the study.

1. What are the library resources in the five health research facilities under study?
2. What is the extent of research productivity in them?
3. What is the major productivity predictor in these health facilities?
4. What is the existing relationship between the library resources and research productivity in these health research facilities?

The Null Hypothesis

There is no significant relationship between available library resources and research productivity in the five Nigerian health research facilities.

Alternative hypothesis (H_a): There is significant relationship between the available library resources and research productivity in the five Nigerian health research facilities.

Significance of the study

This study would directly open up the contributions of library resources on research productivity in the health research institutes in the country and will serve as a reference point to the usefulness and demand for support for libraries in aid of health research in Nigeria. The result will help librarians in decision-making process during procurement of resources while researchers, medical practitioners and other staff would benefit indirectly since it is believed that the technical information from library resources is expected to enhance research results.

Scope of the study

The present study involves only five health research facilities established and funded by the federal government of Nigeria, which are principally involved in health research and development (R & D) activities of the country. The content scope is strictly limited to availability of library resources, extent of research productivity in the study population and the relationship between library resources and research productivity. The geographical scope of the study is Nigeria.

Literature Review

The interest of this work is on the library (information) resources and as Kabir and Holmgren (2005) wrote, the development and implementation of evidence-based health care policy and practice depends on research that addresses the need of the local populace. Such research requires information resources (print, non-print and ICT resources) to be carried out. In a study on availability and adequacy of library resources in Nigerian research institutes, Ochogwu (1992) presumed that even where the resources are available, empirical studies showed that it did not necessarily guarantee access to them.

In addition, studies on research productivity according to Halil and Lewis (1998) have continued to draw attention and record increasing importance since the 70s. Numerous types of studies have examined factors affecting productivity of research organizations and the academic performance of universities in various nations. These studies (for example John, 1994; Levin, Monir and Keith, 2002; and Argyris, 2005) have shown some pertinent indicators used in assessing research productivity in either academic or core research environment. These indicators include the number of faculty members, number of publications- books and journal articles, journal impact factor, registered patents, citation counts, number of products on shelf amongst many others but Card (2006), in his work on the challenges of productivity measurement informed that the hope for one to look for international standards on a common industry problem such as productivity measurement is highly limited.

The study by Tien and Blackburn (1996) showed that there was a particular tracking relationship between age, experience and productivity. The study indicated that as age and experience increase, productivity also increased up to a point and then appears to level off. Popoola (2008) carried out a study on the use of information sources and services and its effect on the research output of social scientists in the Nigerian universities and found that information is an essential commodity that is needed for improved productivity of social scientists in the Nigerian university system. The study also established that use of information sources and services have main and interaction effects on the research output of the social scientists in the first and second generation universities in Nigeria. Since from the reviewed literature, the relationship between library resources and research productivity has not been established in the country, this work is considered relevant.

Methodology

This work is presented as a descriptive survey study. The population of the study consists of 198 research staff of the five health research facilities. Questionnaire and observation

check list were used to collect data. Questionnaire item (s) in a Likert scale (where applicable) was weighed in a four- point scale. Returned questionnaire were 166 and these were used for the study. The researcher used the descriptive statistics for analyses and presented results in tables. Data obtained with observation check list were collated and tabulated to present results for research question 1. The Pearson Products Moment Correlation Coefficient was used to discuss research question 4 which sought to determine relationship. The null hypothesis was tested using t-statistics.

Results

Research question 1

What are the available resources in the libraries of the five health research institutes under study?

The observation check list used by the researcher provided answer to the above question. The results obtained are shown in tables 1 and 2 below.

Table 1: Available library resources in the five health research institutes: Print resources

S/N	Resources	NIPRD Abuja	NITR Kaduna	NNMDA Lagos	NIVR Vom	NIMR Lagos	Total for all the Institutes
1.	Abstracts	2	7	4	6	18	37
2.	Books	2, 275	5,010	1,249	6,105	3,361	18,000
3.	Bibliographies	2	6	-	2	6	16
4.	Conference proceedings	-	5	2	7	4	18
5.	Dictionaries	3	4	2	4	4	17
6.	Encyclopedias	2	5	1	4	3	15
7.	Handbooks	1	3	-	8	8	20
8.	Indexes	-	3	-	3	6	12
9.	Journals	16	17	8	24	15	80
10.	Magazines	-	10	-	187	11	208
11.	Manuals	1	2	-	4	5	12
12.	Maps	3	32	-	20	-	55
13.	Newspapers	2	6	4	4	4	20
14.	Patents	1	-	-	2	-	3
15.	Pharmacopeias	3	3	-	3	3	12
16.	Theses	18	51	-	89	30	188
	Total per inst.	2, 329	5, 164	1, 270	6, 472	3,478	18,713

The quantifiable numbers here indicate titles, volumes or copies of items available

Table 2: Available library resources in the five health research institutes: Non-print resources

S/N	Resources	NIPRD Abuja	NITR Kaduna	NNMDA Lagos	NIVR Vom	NIMR Lagos	Total for all the Institutes
1.	Cassette tapes	-	4	1	6	-	11
2.	Computers	3	60	12	50	6	131
3.	e-books	-	16	-	-	-	16
4.	Fax	-	-	-	1	-	1
5.	Films	-	24	-	30	-	54
6.	Internet Services (provided by different/independent ISPs)	-	2	1	3	1	7
7.	Pictures	-	31	-	11	16	58
8.	Projectors (slide/overhead)	1	2	1	2	2	8
9.	Photocopiers	1	2	1	3	3	10
10.	Reading desks	60	120	25	100	80	385
11.	Shelves	20	80	20	120	40	280
12.	Sound records	-	-	-	20	3	23
13.	Storage devices	-	3	1	6	2	12
14.	VCD/DVDs	-	18	-	40	12	70
15.	Microforms	-	72	-	50	16	138

Research question 2

What is the extent of research productivity in these health research institutes?

The data obtained is presented in table 3 and 4 below. But the table contains overall productivity as measured in ranks as shown in the fourth column. The measure of productivity here was based on the provision of the scheme of service of the federal research institutes which benchmark has been explained in the literature review. They include: Research Assistants = 0; Junior Research Fellow = 2 publications; Research Fellow II = 4 publications; Research Fellow 1 = 10 publications; Senior Research Fellow = 15 publications; Associate Research Professor/ Deputy Director = 20 publications; and Research Professor/ Director = 30 publications. The total productivity per rank is divided by the overall number of researchers in that rank to obtain an individual productivity rate (i.e. the mean shown in fifth column). Thus extents of productivity for individual institutes per staff are: NIPRD = (415/10.12); NITR = (232/8.00); NNMDA = (107/4.65); NVRI = (515/13.21); NIMR = (372/10.94). Overall productivity was 1,641 as against benchmark expectation of 1,307.

Table 3: Extent of productivity in the five research institutes under study

S/no.	Rank of researchers	No. per rank	Total productivity	Productivity per individual	Productivity benchmark	Expected productivity requirement
1	Research Assistant (RA)	8	4	0.5 (1)	0	0
2	Junior Research Fellow (JRF)	24	76	3.16 (3)	2	48
3	Research Fellow II (RF II)	51	271	5.3 (5)	4	204
4	Research Fellow I (RFI)	49	485	9.9 (10)	10	490
5	Senior Research Fellow (SRF)	27	511	18.9 (19)	15	405
6	Assistant Research Professor (ARP)	5	183	36.6 (37)	20	100
7	Total	2	111	55.5 (56)	30	60
		166	1, 641			1, 307

Table 4: Extent of productivity per indicator and institute

	NIPRD (41)	X	NITR (29)	X	NNMDA (23)	X	NVRI (39)	X	NIMR (34)	X	Overall Prod. /indicator	Overall X Prod. /indicator
Journal articles	327	8	177	6	48	2	412	11	283	8	1247	7.51
Book chapters	3	.1	2	.1	2	.1	7	.2	7	.2	21	0.13
Mainline books	1	0	3	.1	5	.2	5	.1	9	.3	23	0.14
Technical reports	10	.2	5	.2	14	.6	23	1	14	.4	66	0.40
Conference papers	20	.5	17	.6	15	.7	29	1	16	.5	97	0.58
Seminar papers	36	.9	25	.9	19	.8	24	1	33	1	137	0.83
Abstracts/ Bibliog.	0	0	2	.1	3	.1	0	0	0	0	5	0.03
Patents	3	.1	0	0	0	0	2	.1	4	.1	9	0.05
Supervision of degr.	13	.3	1	0	0	0	11	.3	5	.1	30	0.18
Prod. Dev.	2	0	0	0	1	0	2	.1	1	0	6	0.04
Total Prod/Inst.	415		232		107		515		372		1641	9.90
Overall X Prod/Inst.	10.12		8.00		4.65		13.21		10.94			

Research question 3

What is the major predictor of productivity in these health research facilities?

From table 4 above (not repeated here), it could be observed that journal article publication is the major predictor of productivity in all the five health research institutes. The results show that NIPRD had 327 such publications; NITR (177); NNMDA (48); NVRI (412) and NIMR (283) according to number of staff that responded.

Research question 4

What is the relationship between available library resources and research productivity in the research institutes under study?

To determine the connection of the two variables within the environment they operate, a correlation study was necessary thus, the resources were classified into ten items of two groups, the print and the non-print resources (called X, **see appendix 3**) and the mean of each group was correlated against the mean of the ten indicators of research productivity (called Y). The Pearson Product Moment Correlation coefficient (r) formula (**see appendix 4**) was then applied to determine their relationship. List of the classified print library resources used for correlation and represented by numbers 1-10 in **table 5** are:

1 = Abstracts/indexes, 2 = Books, 3 = Bibliographies, 4 = Conference proceedings,

5 = Dictionaries/ Encyclopedias, 6 = Handbooks/ Manuals, 7 = Journals/ Magazines/Newspapers

8 = Maps, 9 = Pharmacopeias/ Patents, 10 = Theses. In the same **table 5**, (X) stands for mean of print resources, (Y) stands for mean of productivity indicator, (X²) stands for square of (X), while (Y²) stands for square of (Y) and (XY) stands for product of X and Y.

Again, list of the classified non-print library resources used for correlation and represented by numbers 1-10 in **table 6** are:

1 = cassettes/ tapes, 2 = Computers, 3 = Films/ Microforms, 4 = Internet/e-books, 5 = Photocopiers/ Fax, 6 = Pictures, 7 = Projectors, 8 = reading desks/ shelves, 9 = Sound records/VCDs/DVDs, 10 = Storage devices. In the same **table 6**, (X) stands for mean of non-print resources, (Y) stands for mean of productivity indicator, (X²) stands for square of (X), while (Y²) stands for square of (Y) and (XY) stands for product of X and Y.

In **tables 5 and 6**, productivity indicators which were correlated against library resources in the two instances are placed against the resources and represented by numbers 1- 10. The indicators were tagged as follows: 1 = Published journal articles, 2 = Book chapters, 3 = Mainline books, 4 = Technical reports, 5 = Conference papers, 6 = Seminar papers, 7 = Abstracts/ bibliographies, 8 = Patents, 9 = Supervision of higher degrees, 10 = Product development.

Table 5: Correlation between Print resources per researcher (X) and productivity per researcher/staff (Y)

Rep. Nos.	X	Y	X ²	Y ²	XY
1	0.30	7.51	0.09	56.40	2.253
2	108.43	0.13	11757.06	0.0169	14.0959
3	0.10	0.14	0.01	0.0196	0.014
4	0.13	0.40	0.0169	0.16	0.052
5	0.19	0.58	0.0361	0.3364	0.1102
6	0.19	0.83	0.0361	0.6889	0.1577
7	1.86	0.03	3.46	0.0009	0.056
8	0.33	0,05	0.1089	0.0025	0.0165
9	0.09	0.18	0.0081	0.0324	0.0162
10	1.13	0.04	1.2769	0.0016	0.0452
	$\sum X = 112.75$	$\sum Y = 9.89$	$\sum X^2 = 11762.10$	$\sum Y^2 = 57.66$	$\sum XY = 16.82$

Table 6: Correlation between Non-print resources per researcher (X) and productivity per researcher/staff (Y)

Rep. Nos.	X	Y	X ²	Y ²	XY
1	0.07	7.51	0.0049	56.4001	0.5257
2	0.79	0.13	0.6241	0.0169	0.1027
3	0.05	0.14	0.0025	0.0196	0.007
4	1.16	0.40	1.3456	0.16	0.464
5	0.35	0.58	0.1225	0.3364	0.203
6	0.05	0.83	0.0025	0.6889	0.0415
7	0.07	0.03	0.0049	0.0009	0.0021
8	4.01	0.05	16.0801	0.0025	0.2005
9	0.56	0.18	0.3136	0.0324	0.1008
10	0.07	0.04	0.0049	0.0016	0.0028
	$\sum X = 7.18$	$\sum Y = 9.89$	$\sum X^2 = 18.51$	$\sum Y^2 = 57.66$	$\sum XY = 1.65$

Testing the hypothesis

HO₁: There is no significant relationship between the available library resources and research productivity in the five health research institutes in Nigeria.

Alternative hypothesis (H_a): There is significant relationship between the available library resources and research productivity in the five health research institutes in Nigeria.

Table 7: T-statistics for the significance of the relationship between available library resources and research productivity

Resources	Correlation coefficient, r	t-cal	N	Df	t-critical	Decision
Print resources	0.012	0.15	166	164	1.96	t-cal.<t-crit.
Non print resources	0.038	0.49	166	164	1.96	t-cal.<t-crit.

Discussion

Availability of library resources

The data presented on the available resources in the libraries of the five research institutes showed that based on the established library standards for resource collection, books and non-print library resources in these institutes were generally sufficient. However, periodical materials that are important to health research were inadequate and lacking in all of them. Result of the observation made also gave further insight to this claim indicating that there were 308 titles of periodicals in the five institutes while the collection benchmark was to be 2, 862 titles.

Apart from the inadequacy of the periodical materials, other relevant resources like abstracts, conference proceedings, e-books, indexes, manuals and patent documents were grossly inadequate in all the institutes. Individually, NIPRD, Abuja and NNMDA, Lagos lacked most of the necessary resources needed to scale up research activities. Since the findings here show that standards for books and non - prints were met, the fears entertained by Rosenberg (1997) and Levey (2005) about the vacuum created by inadequacy of library resources in support of research activities in the third world nations like Nigeria may gradually be closing.

On the contrary, since scientific research and particularly medical sciences, requires periodical materials as relevant part of library resources to provide avenues for new trends and research communications, the deficiency in this requirement had vindicated Ochogwu (1992) that there were significant gaps in the provision of relevant resources in the research and university libraries in Nigeria. This result confirms that the problem of inadequacy of vital library resources still exists and also showed that there were no guided programmes for acquisition of resources. It is possible therefore to say that nonuse of acquisition policies in libraries of these institutes have created the opportunity of acquiring more of irrelevant than relevant resources.

Research productivity in the institutes under consideration

The ten productivity indicators measured in this work could be generally categorized into publishing, product development and supervision. The findings show that researchers were more productive in publishing and that peer reviewed journal articles was the highest among other productivity indicators. This could be taken to mean that the interest of researchers was to attain promotion requirements as stipulated in their conditions of service rather than to develop interventions for diseases affecting humanity within the environs. Basically, the institutes were established to pursue certain mandates bordering on health but because the conditions of service put before the staff do not necessarily encourage this, greater effort were channeled towards attaining positions. This might be why the result here was poor on product development and also as evidenced by the result on the number of patents published.

Existing relationship between library resources and research productivity

The relationship existing between available library resources and research productivity in the five health research institutes was positive but not strong. It was even stronger in

association with non-print materials than with print materials. This is unlike the work of Vakkari (2008) who found in a nation-wide survey that researchers in Finland reported a strong relationship and increased productivity in terms of publication for using library resources.

Reasons that account for this condition in Nigeria may include that: relevant library resources which could provide vital information to aid research were lacking in the institutes; use of relevant information resources like electronic books, handbooks, manuals, patent documents, theses and others was limited; good knowledge of exploiting library resources on the part of the researchers might be lacking and finally, from personal observation made, there were other sources of information open to staff of these institutes for their research needs especially the open access resources on the web and the liberalized internet modems made possible by the Global Systems of Mobile (GSM) communications industries.

Since the libraries were deficient in periodical materials that provide information on current empirical studies, researchers may have likely not depended much on the resources available in libraries of their organizations. This very reason is supported by the fact that some of the researchers have personal internet modems and laptops and may have possibly been depending on such connectivity to access information. There is also the possibility of their being registered members and users of other libraries and discussion groups not known to the researcher.

Conclusion and Recommendation

Research in the health science institutes in Nigeria is undoubtedly an indispensable service to the country. Good application of research results in the sector tends to bridge the health gap between developed and developing countries caused by diseases that affect man and animals in their environment. The intent of health science research is to provide interventions

that would cure illnesses. Capabilities for development of interventions to address the problem of ill health differ from country to country but it is believed to be better handled and taken more seriously in the western world than in most of the developing countries. Ironically, a good number of the developing countries like Nigeria have abundant human and material resources to tap from and upscale their health care delivery systems but the reverse is the case with a resultant effect of health problems besieging the country.

Based on the premise that library resources are required and are pivotal in the conduct of health science research, the researcher undertook this study which had four objectives. The result showed that: there were inadequate periodical and other relevant resources in these research institutes; the productivity of the institutes generally met the benchmark as contained in the scheme of service for research institutes in Nigeria; library resources and research productivity have positive but not strong relationship in these institutes and that major productivity predictor was journal article publications.

In view of the above, it could be concluded that if productivity in Nigerian health science research institutes could only be expressed marginally on journal article publications geared towards earning promotions and juicy positions, then one would agree that Nigeria has not strategized well enough in the quest for achieving health-for-all let alone the Millennium Development Goal (MDG) target on health issues by 2015. It is therefore recommended that:

1. In order to make research libraries in this sector more viable, attractive and contributive, other units like Computer Services, Monitoring/Evaluation and Statistics should be merged with the library to form a directorate that could be called Directorate of Information Systems and Services (DISS) and headed by a Librarian.

2. Adequate materials especially periodicals should be acquired by the library with submissions from user groups to cover research profiles of all staff in the health-based research institutes. A viable strategy that would enhance more access to and use of relevant library materials should be devised by the library staff.
4. Research institutes in the health sector should be refocused and encouraged to develop a stream-lined policy on all issues affecting research in their environments. Emphasis here should not be on publish or perish syndrome but on inventive ability to put product on shelves.

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