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A bibliometric analysis of the Aga Khan University Research Contribution in Early Child Development

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Abstract

The research contribution of the Aga Khan University to the Sustainable Development Goals (SDGs) has been explored through a bibliometric analysis. The analysis shows exponential growth of research across the SDGs undertaken by AKU-affiliated researchers. The analysis identified areas of interdisciplinary research, with a significant focus on societal development of interest to AKU, as per its mandate, and reflective of the work of the Aga Khan Development Network (AKDN) of which AKU is an integral part. Building on the bibliometric analysis, this paper focuses on early childhood development and early childhood education with reference to the SDGs. A specific query is undertaken on ECD with respect to SDG 4 (Education) with an in-depth review of ECD reflective of AKU's research output, 2016-2019. The paper presents an analysis of publications by AKU-affiliated authors as indexed in Scopus, a citation database of peer-reviewed literature, which indexes over 15,000 titles. This study presents bibliometric indicators including trends in high-impact publications along with citation analyses of articles, h-index, journal rank, impact factor and societal impact through analysing articles published in open access journals. In undertaking this study and reflecting on the themes of the IHD/CoEWH Conference, the paper makes a scholarly contribution with a specific focus on AKU's research and scholarship to the areas of ECD and the SDGs. The paper notes areas for further research on ECD and SDGs emanating from this analysis.

Introduction

It is estimated that 250 million children in low-and middle-income countries are unable to realise their full development potential (World Health Organisation, 2019). A Lancet study highlighted early childhood development as one of the themes that has been universally endorsed in the Sustainable Development Goals 2030 Agenda (Daelmans et al., 2017). The importance of early child development as a foundation

for a prosperous society ...” should read: “A prosperous and sustainable society needs to be examined from different points of view, including those of economists, child development experts, psychologists, and educators as well as human capital development from an intergenerational and multisectoral approach. This study explores ECD research trends employing bibliometric mapping and bibliometric analysis. Although there has been a substantial increase in

the number of scientific publications on topics central to early childhood development, few organisations have institutionalised mechanisms to measure the research output of early child development and its impact on the society. This study addresses this gap by analysing the AKU's research contribution in the areas pertaining to early child development. AKU, a Development University (Sutton, 1991) works towards improving the quality of life of people in the developing world; IHD and sister AKU entities began their academic and intervention programmes in the developing world with ECD. AKU's work aligns to the Sustainable Development Goals in multiple ways with consonant mandates of poverty alleviation, people-centric approaches, and support for systems' development. A bibliometric analysis of publications and research outputs establishes a concrete, empirical connection between the ECD thematic areas and the SDGs.

The total number of documents published by AKU-affiliated colleagues in the "early child development" category is 442. Annual research productivity shows a significant increase from 111 publications in 2016 to 135 publications in 2018. The majority of the publications originate from Pakistan (30.3%) followed by USA (14.9%), Canada (10%), United Kingdom (7.8%), and Kenya (7.3%). The disciplines and subjects of published documents are: medicine (399 articles); biochemistry, genetics and molecular biology (33 articles); nursing (26 articles); and psychology (14 articles)

Objectives

The aim of this bibliometric analysis is to evaluate the impact of the articles that have been published on early child development by analyzing publications from authors with Aga Khan University institutional affiliation that are indexed in Scopus, a citation database of peer-reviewed literature. Researchers rely on data from Web of Science, Scopus and Google Scholar to assess scholarly communication. However, this study choose Scopus as it covers more than 15,000 journal titles in comparison to Web of Science which covers approximately 9,000 journals.

This paper is unique as it provides a holistic view of the Aga Khan University research in early child development by using scientometrics methods to demonstrate trends, top effective articles, journals, and collaborations between institutions.

Methods

The data for this study were extracted from SCOPUS citation database in which various scientific disciplines are grouped into various categories based on the field of specialisation of various journals. SCOPUS is the largest abstract and citation database of peer-reviewed literature. For the purposes of this study, the category chosen for analysis was "early child development". Results of advanced search analysis were copied and transferred to Microsoft excel for further graphical representation and presentation. An advanced search was performed in SCOPUS and using the following search queries/strings:

(TITLE-ABS-KEY (*early AND childhood AND education*) OR
 TITLE-ABS-KEY (*early AND childhood AND development*) OR
 TITLE-ABS-KEY (*early AND childhood AND care AND development*)
 OR TITLE-ABS-KEY (*adolescent AND health*) OR
 TITLE-ABS-KEY (*child AND health AND development*) OR
 TITLE-ABS-KEY (*child AND rights*) OR
 TITLE-ABS-KEY (*complex AND emergencies*) OR
 TITLE-ABS-KEY (*disabilities AND developmental AND disorders*)
 OR TITLE-ABS-KEY (*environment AND child AND health*) OR
 TITLE-ABS-KEY (*mental AND health*) OR
 TITLE-ABS-KEY (*nutrition AND early AND development*) OR
 TITLE-ABS-KEY (*preconception AND care AND maternal AND health*)
 OR TITLE-ABS-KEY (*violence AND injury AND prevention*))
 AND (AF-ID ("The Aga Khan University" 60052016) OR
 AF-ID ("The Aga Khan University Hospital" 60067302) OR
 AF-ID ("Aga Khan Hospital Nairobi" 60065498) OR
 AF-ID ("The Aga Khan University Medical College" 60064178))
 AND (LIMIT-TO (PUBYEAR ,2019) OR
 LIMIT-TO (PUBYEAR ,2018) OR
 LIMIT-TO (PUBYEAR ,2017) OR
 LIMIT-TO (PUBYEAR ,2016))

Analysis

AKU contributions towards early child development
 A total of 467 publications on early child development

are published and retrieved by authors affiliated to AKU and indexed in Scopus from January 2016 to September 2019 of which 442 publications met the selection criteria. The publications included 366

articles (82.8%), 58 reviews (13.1%), 10 editorials (2.3%), 4 conference papers (0.9%), and 4 books chapters (0.9%). The excluded documents were notes, letters, short surveys, and erratum.

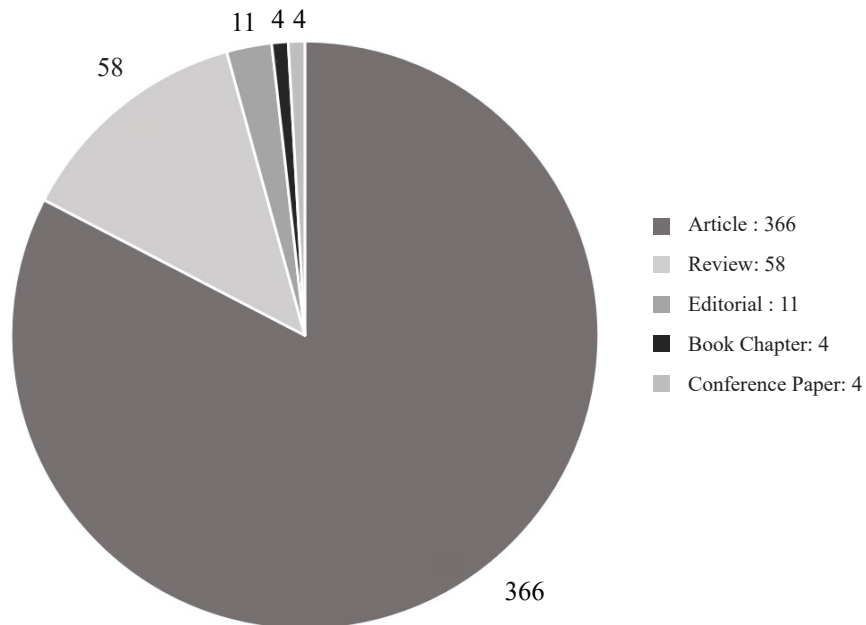


Figure 1: Type of publications included in the analysis

Annual distribution of articles

The annual distribution of research articles indicates areas of interest and organisational commitment to certain topics. An initial count of the number of articles related early child development from 2015 to 2019 reveals this commitment. Of the 467

publications published during the 4-year period (2015- 2019), 135 documents were published in 2018; 133 in 2017; 111 in 2016. Sixty-three papers were published in the first quarter and second quarter (January to September) of 2019.

Table 1: Publishing pattern of AKU researchers on ECD

Year ↓	Documents ↑
2019	63
2018	135
2017	133
2016	111

In the 4-year period, the average number of publications on ECD is 126 per annum. As indicated in Table 2, articles on ECD represent different subject areas and disciplines. Medicine was the most represented with the highest number of articles (399) followed by Biochemistry, Genetics and Molecular Biology

(33), Nursing (26), Immunology and Microbiology (17), Agricultural and Biological Sciences (15), and Psychology (14). Other publications were in related subject areas: Neuroscience; Arts and Humanities; and Social Sciences.

Table 2: Distribution of publications in various subjects

Subject area ↓	Documents ↑
Medicine	399
Biochemistry, Genetics and Molecular Biology	33
Nursing	26
Immunology and Microbiology	17
Agricultural and Biological Sciences	15
Psychology	14
Neuroscience	11
Arts and Humanities	8
Social Science	6
Multidisciplinary	3

Analysis of the journals

The table below lists the first 10 journals ranked by the number of ECD articles published by AKU affiliated authors.

Table 3: Top 10 journals of AKU published documents in early child development

#	Journal Name	Country of publication	No. of articles published	Percentage
1	Journal of the Pakistan Medical Association	Pakistan	50	29.4 %
2	Lancet	Netherlands	34	20.0 %
3	Reproductive Health	UK	17	10.0 %
4	Pakistan Journal of Medical Sciences	Pakistan	13	7.6 %
5	Lancet Global Health	Netherlands	10	5.9 %
6	Plos One	US	10	5.9 %
7	Journal of the College of Physicians and Surgeons Pakistan	Pakistan	11	6.5 %
8	Journal of Adolescent Health	Netherlands	9	5.3 %
9	BMC Public Health	US	8	4.7 %
10	BMJ Open	UK	8	4.7 %

AKU authors publish in a wide range of journals distributed across various countries, with Pakistan being the most significant country of publication (74 publications), followed by Netherlands (53 publications), United Kingdom (25 publications) and United States of America (18 articles). AKU-affiliated authors published 442 papers in 157 journals. The scatter across journals is striking

as at least 10 journals published at least 8 or more articles representing (38.5%). The top 5 publications, where the majority of ECD-related documents were published are the Journal of the Pakistan Medical Association (50 articles), Lancet (34 articles), Reproductive Health (17 articles), Pakistan Journal of Medical Sciences (13 articles), Lancet Global Health (10 articles), and Plos One (10 articles).

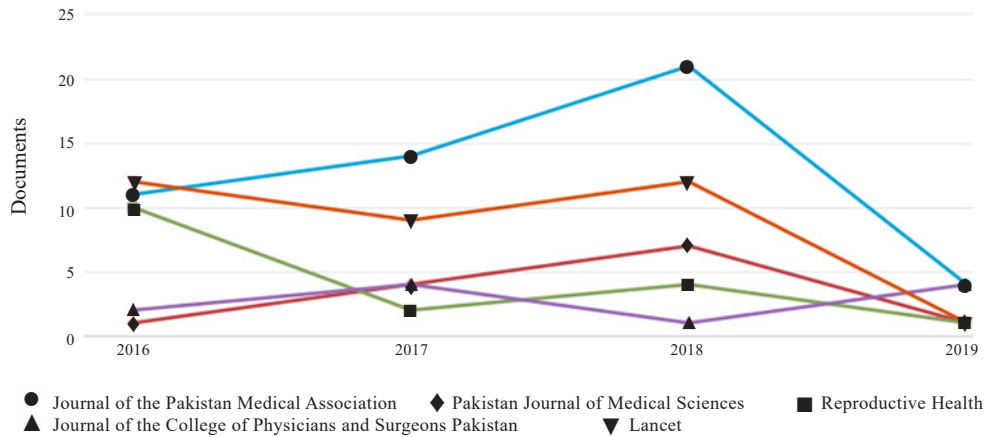


Figure 2: Publications per year by source

Distribution of AKU affiliated researchers

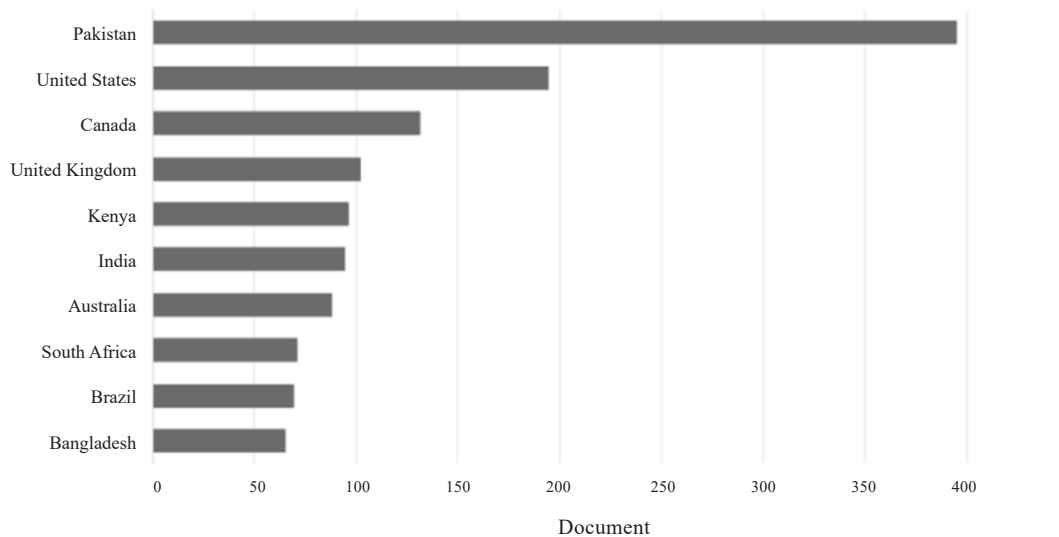


Figure 3: Distribution of AKU affiliated researchers

As demonstrated in figure 3, AKU-affiliated researchers represent work in various countries. The majority of

the documents were published by researchers based in Pakistan (395 articles), followed by the United States

of America (194 articles), Canada (131 articles), the United Kingdom (102 articles), Kenya (96 articles),

India 94 articles, Tanzania (53 articles), and Uganda (25 articles).

Citation analysis

The total number of ECD papers, 442, were cited 11,156 times from 2016 to 2019 (Table 4).

Table 4: Citation analysis of ECD publications 2016 – 2019

Year	No. of times cited	No. of citing documents
2016	449	343
2017	2,395	1,999
2018	5,346	4,447
2019	6,184	5,322

The 442 ECD documents were cited 14,404 times by 12,136 documents from 2016 to 2019: For 2019, the citation index is incomplete as the study was carried

out during the second quarter of the year. Figure 4 shows the citation overview of the 472 documents over a period of four years, 2016 to 2019.

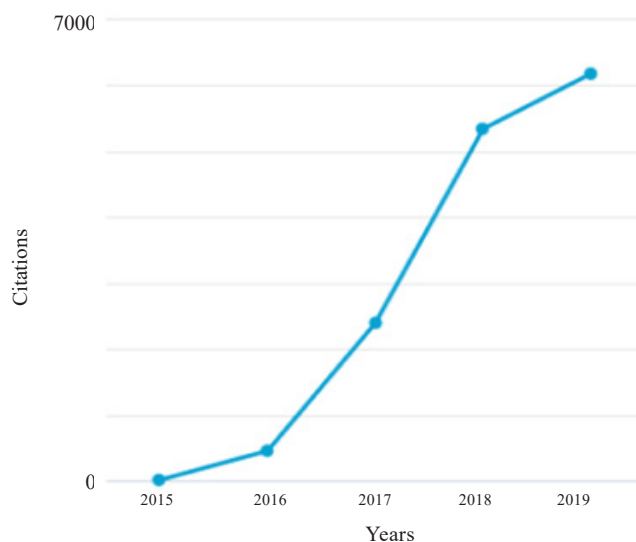


Figure 4: Citation overview 2016 – 2019

Analysis by affiliation

AKU-affiliated researchers collaborate with researchers from various institutions across the world demonstrating a high level of collaboration with partner institutions in ECD research. Figure 5

below shows that AKU colleagues published with other AKU collaborators (464 articles), followed by: Hospital for Sick Children University of Toronto (101 articles); London School of Hygiene and Tropical Medicine (60 articles); University of Toronto (56

articles); International Centre for Diarrhoeal Disease Research Bangladesh (50 articles); Johns Hopkins University (50 articles); National Institutes of Health, Bethesda (49 articles); University of Virginia

(47 articles); Johns Hopkins Bloomberg School of Public Health (47 articles); and Harvard School of Public Health (46 articles).

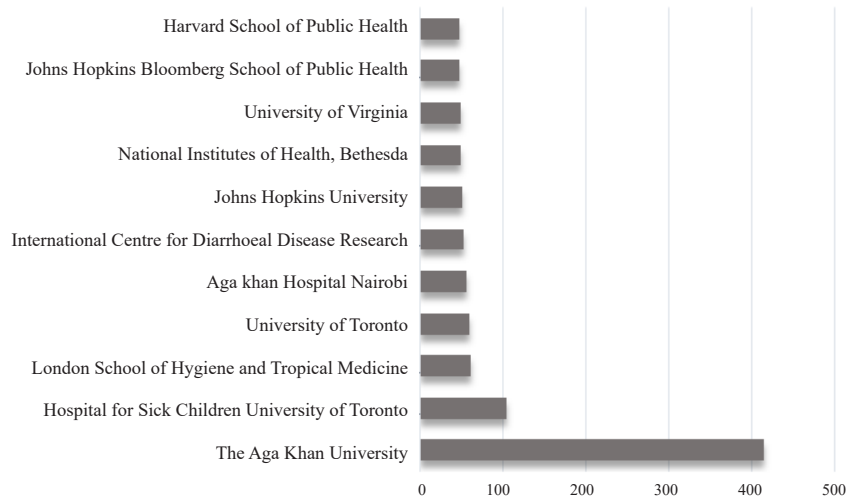


Figure 5: Analysis by affiliation

H-Index

The h-index is an author-level metric that attempts to measure both the productivity and citation impact of the publications of a scientist or scholar (Hirsch,

2005). The h-index of the 442 documents is 39, which means that out of the 442 documents 39 documents were cited at least 39 times.

These documents h-index

Of the documents considered for the h-index, 39 have been cited at least 39 times

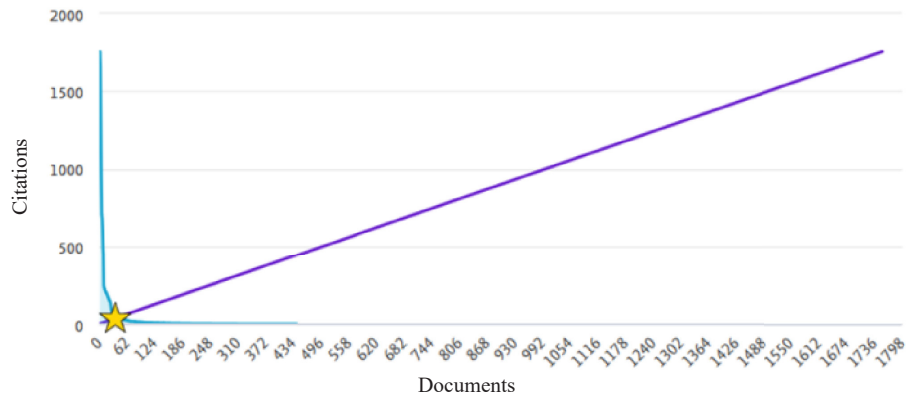


Figure 6: H-index of ECD documents published by AKU affiliated authors

Impact factor of highly cited publications

Impact factor is a measure of the frequency with which the average article in a journal has been cited in a particular year or period (Glänzel & Moed, 2002). It is generally believed that journals with higher impact factor in a particular field publish on average

more papers than journals with lower impact (Reuters, 2008). Impact factor is associated with how prestigious a journal is considered to be and the effect it has in its field. Table 5 shows impact factor of the top 10 journals where AKU affiliated authors published ECD related articles.

Table 5: Impact factor of the top 10 highly published journals

#	Journal Name	No. of articles	No. of times cited	No. of citing documents
1	Journal of The Pakistan Medical Association	50	30	0.718
2	Lancet	34	11428	53.254
3	Reproductive Health	17	88	2.014
4	Pakistan Journal of Medical Sciences	13	30	0.719
5	Lancet Global Health	10	257	18.705
6	Plos One	10	34	2.766
7	Journal of the College of Physicians and Surgeons Pakistan	9	7	0.439
8	Journal of Adolescent Health	9	263	3.612
9	BMJ Open	8	21	2.376
10	BMC Public Health	8	28	2.42

Analysis by funding organisations

AKU ECD research is funded by a wide variety of organisations. As demonstrated in figure 7, the top funding organisations are the Bill and Melinda Gates Foundation (72 publications), National Institutes of Health (48 publications), World Health Organisation (24 publications), Foundation for the National Institutes of Health (23 publications), Hospital for

Sick Children (23 publications), National Health and Medical Research Council (23 publications), and the University of Sydney (23 publications). Other significant funding organisations were Fogarty International Center (22 publications), Johns Hopkins University (22 publications), South African Medical Research Council (22 publications), the Medical Research Council (21), and the Wellcome Trust (21).

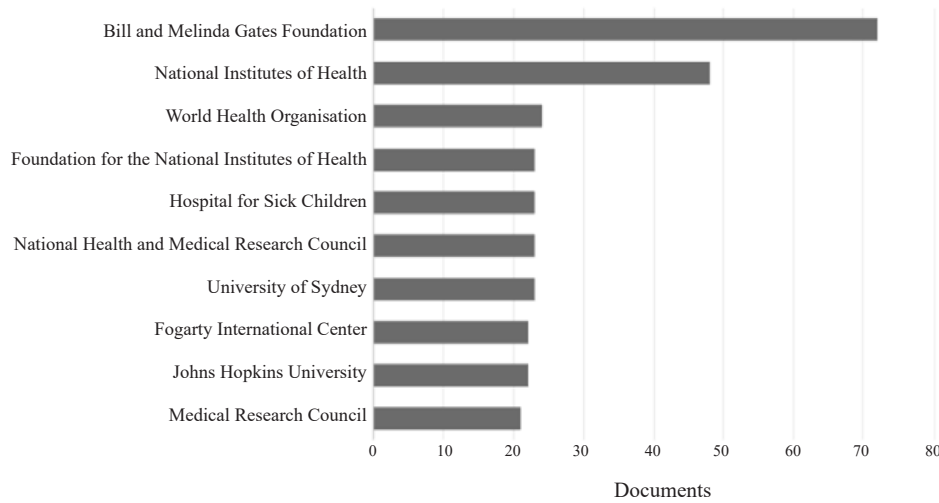


Figure 7: Analysis by funding organisations

Societal impact and relevance of AKU ECD publications

Altmetric explorer was used to measure the societal impact of and societal attention given to ECD publications by AKU affiliated authors. Altmetrics (alternative metric) measure research impact by providing information on web-driven scholarly

interactions for an article and is intended to be complementary to traditional, citation-based metrics (Elmore, 2018). This metric shows where and how AKU ECD research is mentioned in various places, including policy documents, patents, the press, blogs, and on social media (Table 6).

Table 6: Altmetric analysis of top 5 highly relevant articles

#	Article	Citations	Mendeley Readers	Attention Score	Mentioned by	Geographical breakdown (top 3)	Demographic breakdown
1	Nurturing care: promoting early childhood development The Lancet, 2017	221	680	69	News outlets - 2 Blog – 1 Policy sources - 6 Twitter - 36 Facebook pages – 3 Wikipedia -1 Googleplus – 1	UK - 22% USA - 14% Canada- 8%	Members of the public - 53% Scientists - 28% Practitioners - 17%
2	Promoting early child development with interventions in health and nutrition: A systematic review Pediatrics, 2017	17	157	5	Twitter - 11 Facebook pages – 1	UK – 27% Spain – 9% USA – 9%	Members of the public - 82% Scientists - 18%

#	Article	Citations	Mendeley Readers	Attention Score	Mentioned by	Geographical breakdown (top 3)	Demographic breakdown
3	Investing in the foundation of sustainable development: pathways to scale up for early childhood development The Lancet, 2017	161	580	98	News outlets - 5 Blog – 3 Policy sources - 4 Twitter - 43	UK - 19% USA - 12% Rwanda - 9%	Members of the public - 77% Scientists -14% Practitioners - 5%
4	Prioritizing research for integrated implementation of early childhood development and maternal, newborn, child and adolescent health and nutrition platforms Journal of Global Health, 2017	11	91	4	Twitter - 5 Facebook pages – 1	USA - 40% Switzerland - 20%	Practitioners - 60% Members of the public - 20% Scientists - 20%
5	Effects of responsive stimulation and nutrition interventions on children's development and growth at age 4 years in a disadvantaged population in Pakistan: a longitudinal follow-up of a cluster-randomised factorial effectiveness trial The Lancet Global Health, 2016	39	204	84	News outlets - 8 Blog – 1 Twitter – 16 Facebook pages – 2	UK -19% USA -6% Denmark -6% Comoros -6% Italy -6% Sweden -6%	Members of the public - 63% Scientists -25% Practitioners -6%

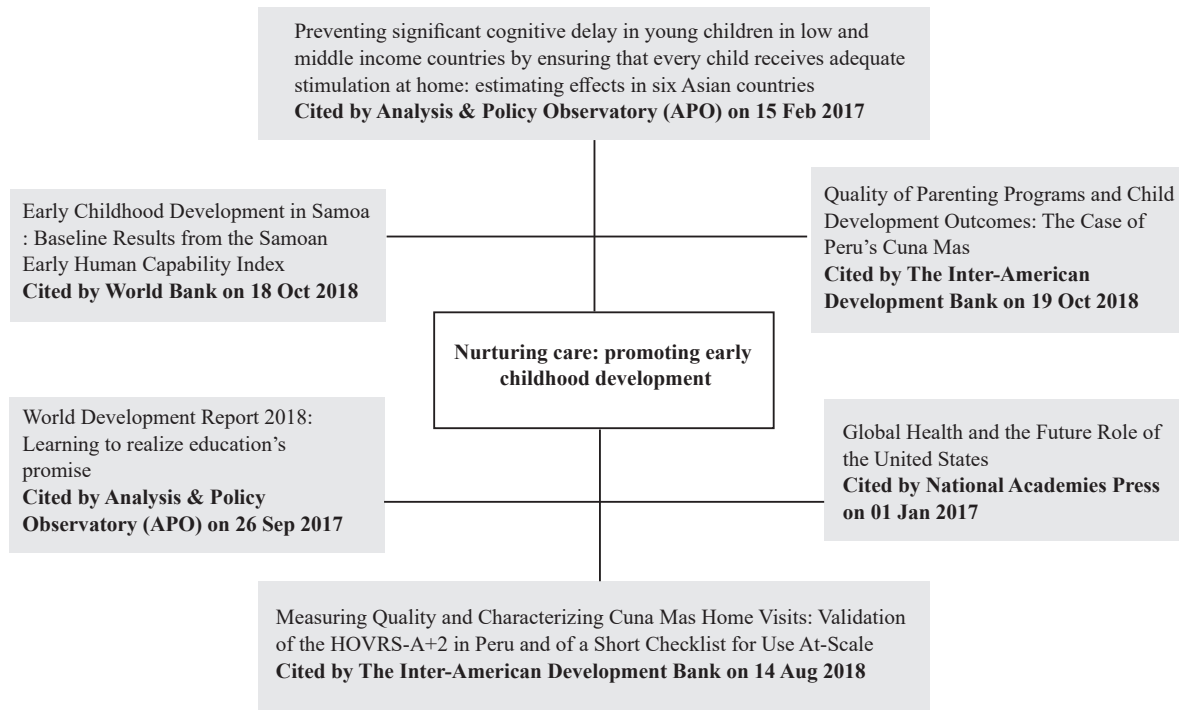


Figure 8: Policy level analysis as reflected through the Nurturing Care Framework

Results

This analysis relies on the WHO (2018) Nurturing Care Framework and Aurora SDG search terms to develop the analytical framework. This further focuses on the six domains that contribute to ECD which is the basis of SDG 4.2. The total number of documents retrieved for early child development by scholars affiliated to the Aga Khan University was 467 publications. The results revealed that there was an increase in the research interest of AKU researchers in ECD in the last 4 years. AKU annual research productivity in early child development is 126 which is significant production for a university operating in low and middle-income countries.

Discussion

The basis of ECD in the life course of individuals and the supportive benefits are well established in the literature. These range from resilience and ability to withstand shock in diverse contexts including

deprivation, conflict and fragility to building human capital that increases the potential of individuals and communities to contribute to the evolving knowledge society. The develop of neuroscience and brain development in utero and the early years is beginning to dominate ECD with a critique that the discourse reinforces a bio-medical model of human development on the one hand and a reinforcement of technical development programming on the other hand. The literature identified in this study shows the importance of culture, indigenous knowledge and knowhow, and values propositions of developing country contexts to inform relevant conceptualisations and approaches to ECD. These need further exploration with systematic reviews to determine the academic-praxis modes of operation as well as relevant and needed research in diverse settings. It is considered that filling such knowledge gaps would support coherent and responsive human development and limit hegemonic and limited understanding of human beings that are reinforced from the extant literature.

Limitations

Despite its contributions, the current study had some limitations as data were gathered from a single database, Scopus. Although Scopus provides broad journal coverage, other comprehensive citation databases for search purposes can also be used (for example, Web of Science).

Conclusions

In this scientometrics research, we focused on analysing early child development publications by authors affiliated to the Aga Khan University. This analysis reveals AKU has made significant progress in the 4-year period of review, 2016 to 2019, with an average of 126 publications per year. Apart from the growth of average number of articles, the depth and breadth of the research has grown significantly. The most significant collaborations occurred among authors and organisations primarily within the institution itself followed by work with colleagues from USA, Canada, and the UK. The Journal of the Pakistan Medical Association, Lancet, Reproductive Health, Pakistan Journal of Medical Sciences, Lancet Global Health, and Plos One represent the top order of publication outlets. This study provides the first inclusive mapping and analysis of scientific research papers on early child development published by AKU affiliated researchers. As such, it provides a basis for further work particularly in supporting more in-depth systematic reviews to generate contextually-specific knowledge to support the development of ECD in the regions AKU operates.

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