FLORIDA STATE UNIVERSITY

COLLEGE OF INFORMATION

THE SCHOLARLY USE OF JOURNALS OFFERED THROUGH THE HEALTH INTERNETWORK ACCESS TO RESEARCH INITIATIVE (HINARI) AND ACCESS TO GLOBAL ONLINE RESEARCH IN AGRICULTURE (AGORA) PROGRAMS AS SUGGESTED BY THE JOURNAL-CITING PATTERNS OF AUTHORS IN THE LEAST-DEVELOPED NATIONS

By

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

The Health Internetwork Access to Research Initiative (HINARI) and the Access to Global Online Resources in Agriculture (AGORA) programs provide free access to academic journals through the internet to researchers in the developing world. The objective of the programs is to engage researchers in the scholarly communication process through the scholarly use of these journals. A measure of scholarly use of a journal by a researcher is the number of times the journal is cited by that researcher. A citation study was conducted to explore the patterns of use of these journals by researchers in eligible countries.

Bibliographic data for citations made by researchers from 108 eligible countries for each year from 2000-2007 were downloaded from the Science Citation Index and the Social Science Citation Index. The citation data were matched against HINARI and AGORA title lists in a database developed for this purpose. The frequency of citations made to journals in the AGORA and HINARI collections and the annual percent change in the frequency of these citations were analyzed for suggestions that the programs positively impacted the scholarly use of the journals by these researchers.

The data treatment for each country, sub-region and region was guided by twelve research questions. Results were summarized and interpreted at the regional level. The data suggests that for some geographic groups, life science and agricultural researchers have become more engaged in formal scholarly communication since the initiation of the HINARI and AGORA programs and at a greater average percent change than other researchers. However, data for other geographic groups suggest that their researchers have not become more engaged in the scholarly communication process. Further research that couples these findings with other data will lend explanatory power to the results and inform future program planning for HINARI and AGORA.

CHAPTER 1. INTRODUCTION

1.1 Introduction

The United Nations (UN) has undertaken an ambitious quest to reduce poverty and increase the quality of life worldwide in its Millennium Development Goals (MDGs). It is widely recognized that information and communications technologies (ITCs) play a crucial role in this endeavor (United Nations [UN] General Assembly, 2000). In an effort to bridge the information divide, several programs have been initiated. One set of programs is designed to "enhance the scholarship of the many thousands of students, faculty and researchers in agriculture and life sciences in the developing world" by making proprietary scientific, technical and medical research literature available free of charge over the internet (UN Food and Agriculture Organization [FAO], 2007a).

In 2002, the World Health Organization (WHO) in collaboration with Yale University and leading scientific publishing houses began providing the world's least developed nations with free access to biomedical research journals in their Health Internetwork Access to Research Initiative (HINARI) (UN WHO, 2007a). In 2003, a similar initiative called Access to Global Online Resources in Agriculture (AGORA) was launched by the FAO and Cornell University to provide free or low cost access to major scientific journals in agriculture (UN FAO, 2007a). While not included as a part of this study due to its recent launch, in late 2005, a third program was added called Open Access to Resources in the Environment (OARE), which is sponsored by the UN Environment Programme (UNEP) and Yale University (UN EP, 2007).

The shared goal of these programs is to enhance scholarship in the developing world. HINARI and AGORA provide free electronic access to journals through the internet to eligible researchers. While there has been ongoing access to proprietary journals through organizational or individual subscriptions to print resources or perhaps to discounted electronic collections irrespective of these UN programs, it is likely that many potential researchers in these countries had not had access to these materials due to cost barriers. By providing free access to these collections, the UN should have increased the readership of the journals, thereby increasing the scholarly use of the journals. Further, by providing electronic access via the internet, these programs should have encouraged

greater scholarly use of the journals by researchers already obtaining them through some other means, such as a print subscription.

There are several means of quantifying journal use (Coleman, & Malone, 2006). Currently, the WHO tracks electronic transactions that take place through its servers. These servers provide a portal through which HINARI and AGORA registrants access participating publishers' databases. These transactions reveal the downloading of articles to IP addresses at certain organizations (Aronson & Long, 2003). While this information is quite valuable, it does not speak to the scholarly quality of that use. The downloading of a document does not necessarily indicate that it will influence scholarship. However, if a researcher cites that document in his or her own published work, this is an indication that the document has not only been used, but used in a scholarly manner.

This study assembled a complete body of citation data collected from Thomson Scientific's Science Citation Index (SCI) and Social Science Citation Index (SSCI). This initial data set contained bibliographic information on all citations made by researchers in eligible countries for each year from 2000 to 2008. This data was prepared and imported into a database designed specifically for this study. This database matched citation information with journal information, producing counts of citations made to specific sets of journals. Frequency and the percent change in frequency were calculated for citations made to journals provided through HINARI and AGORA, as well as a Control set. The Control set was comprised of all other journals indexed in the SCI and SSCI that were not available through AGORA or HINARI.

The results of this study provide 1) a comprehensive quantitative survey of scholarly journal use by the eligible researchers targeted by the HINARI and AGORA programs, 2) a rich body of data that may be further analyzed to support program development and 3) a unique protocol for data collection and treatment that may be used to achieve similar research objectives.

1.2 Conceptual Framework

This study was designed to provide a comprehensive quantitative survey of scholarly journal use by researchers eligible to participate in the HINARI and AGORA programs. As such, concepts from the field of scholarly communication figured prominently in the

study's design. Moreover, as a type of citation analysis was used to explore the research questions, comprehension of bibliometrics was essential. While scholarly communication and bibliometrics informed the conceptual framework of this study, other conceptual areas were considered as well. The HINARI and AGORA programs exist in a complex environment where issues concerning the global information society and scholarly communication intersect. As it is expected that these results will be further analyzed to focus program planning, it is important to acknowledge the context in which the programs have developed and operate. Therefore, concepts from the global information society literature and historical notes on the programs themselves informed this study also.

The HINARI and AGORA programs exist to improve scholarship among researchers in the developing world. The environment in which these researchers work and communicate has been evolving as a result of globalization and improvements in ICTs. Bell (1973) was one of the first to recognize that advances in technology had brought about fundamental shifts in the ways that people create, find, retrieve, share, store, and use information. He suggested that civilization had moved from an industrial age to an information age (Bell, 1973). This phenomenon has had the impact of continuing, perhaps exacerbating, the economic divide between the North and South (Castells, 2006). Economic divides, as they relate to the information society are often referred to as digital divides. The HINARI and AGORA programs are efforts to help bridge the digital divide between the developed and developing world.

The North-South digital divide is particularly evident in patterns of scholarly communication (Persaud, 2001). Scholarly communication has been defined as the use and dissemination of information through formal and informal channels by scholars in any field (Borgman, 1990, p. 13). Although scholarly resources are now available in a variety of media, such as online courses and scientific databases, since the 1660s, the most common medium of scholarly communication has been the peer-reviewed journal (Swan, 2006). The journal remains the primary medium due to the role of journal publishers in the evolving economics of information access (Willinsky, 2006), and the cultural entrenchment of academic organizations (Kurtz, & Brody, 2006).

Although scholarly communication has been basic to academic culture in the industrialized countries of the North for several hundred years, it has just recently emerged in the agricultural countries of the South (Lor, 2006). While the HINARI and AGORA programs do not organize their efforts around the North-South concept specifically, their primary concern is to improve the participation of researchers in the developing world in the formal scholarly communication process. The reduction of the digital divide between the North and South is both the impetus for and the result of their efforts. An effective means of understanding the formal scholarly communication process by a specific population is its scholarly use of academic journals. Citations to journals are indications that they have been used in a scholarly manner.

The citation data for the most authoritative journals in any given scientific or social scientific field are indexed by Thomson Scientific. These indexes served as the source of the data analyzed in this study. Citation analysis is a type of bibliometric research method and is appropriate for the analysis of formal scholarly communication. In their guide to informetrics, Egghe and Rousseau (1990) provided a section which outlined the many ways in which citation data is used in research. It is most often used to evaluate the impact of authors, organizations or journals. Eugene Garfield has been credited with developing these evaluative techniques (Garfield, 1972). Citation studies also have included investigations into the use of local journal collections as measured by citations to those collections by a specific group of researchers (Egghe & Russeau, 1990). The premise that citations are valid indicators of scholarly journal use, and often usefulness, has been supported by dozens of studies (Todorov & Glanzel 1988).

1.3 Significance of the Study

Programs such as HINARI and AGORA advance formal scholarly communication as a means of reducing the North-South divide. It is essential that the WHO and FAO continue to take advantage of the continuation of these programs to the fullest extent. All parties have agreed to extend HINARI, AGORA and OARE until the year 2015, when the UN intends to have met its MDGs. The WHO and FOA have until then to reach out to countries struggling to overcome barriers not necessarily related to the cost of the

content or its freeness of access over the internet so that researchers in the developing world can successfully participate in global scholarly communication.

While capacity building through training and outreach are critical components of HIANRI and AGORA, there is little understanding of the patterns of formal scholarly communication in the least developed countries to help focus these efforts. A broad base of data is essential to facilitate an assessment of the programs' impact in various regional, sub-regional, and national contexts. A comprehensive survey of scholarly journal use aids in the identification of geographic areas meeting with success. It also helps identify geographic areas failing to fully engage in formal scholarly activity despite the availability of journals through the programs. This study has fulfilled this need.

Moreover, the results of this study may serve as data for future studies. By combining these study results with data from internal records and research conducted by the programs themselves, useful knowledge may be gleaned. For instance, the data may be analyzed with download statistics to determine the relationship between practical use and scholarly use. To help inform outreach and training initiatives, these study results may be matched to previous training and outreach records, to identify their relationship with geographic areas experiencing success and geographic areas that need more attention. As qualitative research is ideally suited for comprehending complex environments, further research in this vein may be justified based on the findings of these studies.

Finally, while the research methods in this study are grounded in a familiar, though infrequently used, application of bibliometrics, the procedures for data collection, organization and treatment are unique. These processes may be replicated to address similar research needs. In the present study, for any given group of authors, in any given time period, the bibliographic data for citations were matched to one of three sets of journals: the HINARI set, the AGORA set, or a Control set. The data treatment compares the percent change in frequency of citations to journals in the three sets. This analysis can be executed for any defined user group in order to better understand their scholarly use of specific sets of journals.

1.4 Research Problem and Questions

The goal of the HINARI and AGORA programs is to increase the scholarly use of collections of journals by researchers in the least developed nations. The primary means by which this goal is achieved is through making the journals freely available over the internet. A comprehensive survey of the scholarly use of HINARI and AGORA journals is essential for understanding the scholarly communication environment of the targeted researchers. The WHO and FAO also offer training and support to help scholars overcome barriers to participation; data about the scholarly use of their journal sets will enable program planners better focus their efforts. The following broad research questions were posed to explore this problem.

- Have researchers from the eligible countries made greater scholarly use of the journals available through the HINARI and AGORA programs since their initiation, and has this use been greater than that of other journals which are not freely available through these two programs?
- Do regional and sub-regional aggregations of researchers from the eligible countries demonstrate variation in their use of the journals available through the HINARI and AGORA programs?

1.5 Limitations of the Research

If a journal has been cited, it may be assumed that it has been used. While citations are not perfect indicators of overall journal use, this measure has been extensively employed in library science for this purpose. It should be noted that other types of journal use that do not result in a citation behavior are possible. These include, but are not limited to browsing and reading (McCain & Bobick, 1981). These other types of journal use may or may not enhance scholarship. Since the programs under study specifically intend to enhance scholarship through their efforts, citing behavior was the most appropriate measure for this study. While these other types of journal use may lead to the enhancement of scholarship, these dynamics were not addressed.

Data treatment in this study was guided by twelve questions for each geographic area being considered. The resulting data suggested relationships. As there was no direct manipulation of variables, no causal relationship was implied. Moreover, it was

impossible to account for all potentially confounding environmental factors. The inclusion of Control set served to distinguish between an environment with influencing variables that affect scholarship in all disciplines and an environment with influencing variables that effect only life science or agricultural researchers. Examples of influencing variables common to scholarship in all disciplines would be changes in ICT infrastructure, information literacy, and cultural approaches to scholarship. Since the effect of such factors would have been present in all sets of citations, any remaining differences among the sets were not a result of these common factors, but rather, influencing factors specific to the scholars targeted by the HINARI or AGORA programs. In these instances, the relationship between the influence of the programs and the positive data was strengthened; however, this should not be misinterpreted as being a cause and effect relationship.

The results of this study provide a comprehensive overview of academic journal use in the HINARI and AGORA eligible countries from 2000-2008 through citation activity. Results are presented at four levels of aggregation: country, sub-region, region, and world. Each set of results is valid only in the context in which it is presented. The results from this study are not generalizable or transferable. Furthermore, the resulting data is meant to provide description, rather than be prescriptive. While the results are presented in such a way as to be usefully combined with other data for the purposes of decision making, the results should not be used for this purpose in isolation.

Finally, every possible effort was made on the part of the researcher to ensure that this study can be duplicated by others through careful documentation of procedures. However, the reliability of the data obtained from other sources, both in terms of its accuracy and its permanency, is beyond the control of the researcher (Vlachý, 1985). Access to the large amounts of information available through these sources outweighs the potential of error on the part of the vendor.

CHAPTER 2. LITERATURE REVIEW

2.1 Introduction

The HINARI and AGORA programs operate in an environment characterized by the impacts of globalization and the development of the information society. The programs advance scholarly communication, particularly in the fields of life sciences and agriculture to improve the standard of living in the least-developed nations. Scholarly communication is a basic practice among researchers in the developed world and is studied as a phenomenon in its own right. Indeed, it is responsible for the creation of a set of research methods known as bibliometrics. Ideas from the fields of scholarly communication and bibliometrics have been central to the conceptual and methodological development of this study. The following literature review will cover the background of the HINARI and AGORA programs, aspects of globalization and the information society, scholarly communication, and bibliometrics.

2.2 HINARI and AGORA

Economic development on a world wide scale has been an important agenda item for the organizations of the United Nations since its inception and remains so to the present (UN General Assembly, 2000; UN Economic and Social Council, 2000; UN Organization for Economic Cooperation and Development, 2004). During this time, the social, technological and political landscape has changed dramatically, causing equally dramatic change in economic development efforts. There has been a recognition of information disparities among nations with respect to resources, capacity and opportunity which has led to attempts to level the playing field (UN General Assembly, 2000; UN Economic and Social Council, 2000; UN Organization for Economic Cooperation and Development, 2004). Throughout the 1970s and 80s, the UN Educational, Scientific and Cultural Organization sponsored debates known as the New World Information and Communications Order (Pickard, 2007). These discussions advanced the support initiatives and policy that foster an inclusive information society by developing infrastructure and capacity (UN International Telecommunications Union [ITU], 2003a, 2003b).

The ITU sponsored the World Summit on the Information Society (WSIS) in Geneva in 2003 and Tunis in 2005 to formulate goals and strategies for closing the information divide through the development of information and communication technologies (ICTs). The resulting documents furthered the vision of the General Assembly's development initiatives as outlined in the Millennium Development Goals (UN General Assembly, 2000). In 2005, the Geneva Declaration of Principles was adopted, followed by the Geneva Plan of Action, which translated the principles into concrete action lines. All nation-state signatories of these documents agreed to develop and implement nationally-sustainable strategies to promote ICT-based products and infrastructures (UN ITU, 2003a, 2003b).

Several action lines in the Geneva Plan of Action spoke directly to the provision of scholarly information. Of particular import was action line 'C7. ICT Applications: Benefits in All Aspects of Life'. It declared that ICT applications can support sustainable development, in the fields of public administration, business, education and training, health, employment, environment, agriculture and science. It recommended that in order to support E-science, strategies should "promote electronic publishing, differential pricing and open access initiatives to make scientific information affordable and accessible in all countries on an equitable basis" (UN ITU, 2003b). The United Nations Educational, Scientific, and Cultural Organization (UNESCO) has been assigned as facilitator of this action line and has begun implementing strategies with the Committee on Data for Science and Technology (CODATA); specifically, they are designing a global science commons (CODATA, 2007; Iwata, & Chen, 2005; Lubchenco, & Iwata, 2003).

Other UN organizations have continued to build on previously implemented international initiatives to improve access to scholarly information. Because access to current, quality research was particularly crucial for the least developed countries suffering from disease and hunger, in 2002, the WHO collaborated with the leading scientific publishing houses in the North to provide developing nations with a gross national income (GNI) per capita less than $1000 with free access to their biomedical research journals, which led to the Health InterNetwork Access to Research Initiative (HINARI) (UN WHO, 2007a). In 2003, the initiative expanded to allow institutions in

countries with a GNP per capita of between $1000 and $3000 per year to access the online material now available through HINARI for $1000 per eligible organization. Money raised from those fees has been spent to train librarians and researchers on information technology so that the best use can be made of the information available to them (Ochs, Aronson, & Wu, 2004).

In 2003, a similar initiative called Access to Global Online Research in Agriculture (AGORA) was launched by the FAO to provide free or low cost access to major scientific journals in agriculture and related environmental fields to public institutions in developing countries (UN FAO, 2007a). AGORA has received funding and support from Cornell University Mann Library, the Rockefeller Foundation, the UK Department for International Development, WHO, and the US Agency for International Development. It has built on the work of The Essential Electronic Agricultural Library (TEEAL), an annually produced CD-ROM product containing the full-text of articles from a small collection of important agricultural journals. TEEAL continues to be available at low cost for qualifying countries.

2.3 Globalization and the Information Society

International initiatives, such as HINARI and AGORA are a response to growing inequities between the wealthiest and poorest populations in the world. Many believe that this economic gap has been exacerbated by the processes of globalization. Globalization presents both promises and threats to the developing world, and accordingly, has inspired movements for and against it (Zea, 2003; Harris & Seid, 2000). While some believe that the potential economic benefits of globalization are worth certain compromises, it has been asserted by its opponents that the vast majority of individuals and organizations are not independent agents of globalization, but rather dependent objects (Fornet-Betancourt, 2003). Irrespective of one's position, it has become apparent that in its contemporary context "devising alternatives to neo-liberal market capitalism has become increasingly difficult" (Petrella, 2002, p. 200). Therefore, many scholars have turned to the study of how to best move forward (Kacowicz, 2005).

In 1983, Levitt published an influential essay which began: "A powerful force drives the world toward a converging commonality, and that force is technology. It has

proletarianized communications, transport and travel" (p. 92). Thus commenced the scholarly discussion of globalization. As a professor of business administration, Levitt focused his analysis on the global marketplace. He suggested that commercial corporations should no longer attempt to cater to markets in specific regions, nations, or cultures, but rather attempt to treat all populations as a whole. While he acknowledged that ancient attitudes and heritages will persist, he maintained that there is an overwhelming push toward modernity, the adoption of new technologies, and the consumption of the most advanced goods and services. The result of this seemingly inevitable activity is "a general drift toward the homogenization of the world" (Levitt, 1983, p. 93). This statement has spurred varied reactions from scholars and policy makers of the world's governmental and non-governmental organizations (Tulchin & Espach, 2001).

As a response to, or perhaps as an effort to bolster, the processes of globalization, institutions such as the International Monetary Fund and the World Bank were formed. The world's wealthiest capitalist nations were instrumental in their development; the United States in particular, played a dominant role in deciding their structure and policies (Woods, 2003). It has been suggested that the formation of such organizations was not meant to promote an atmosphere of neutrality, but rather one that either forcefully imposed the hegemonic values of capitalism onto non-capitalistic societies or to further the existing economic stratification to support the capitalistic ends of the wealthiest nations (Bello, 2000; Keet, 2000). Any of these possible motivations, or even all in concert, unabashedly serve the systems of advanced capitalism and the interests of modern capitalists. For many however, the driving forces of modern capitalism are not acceptable values on which to base an economy. These individuals have been urged to weigh what they believe to be the negative consequences of these capitalistic organizations against the 'public goods' that the organizations provide (Woods, 2003, p. 93).

Despite these recommendations, social critiques on the push to globalize the world economy have continued. Scholars often invoke a concept known as the North-South divide, which refers to the economic disparities among the world's inhabitants (Horton, 2000). Scholars from the South, such as Bello (2000) have suggested that the IMF and

the WTO were formed for the primary purpose of containing and controlling development in the countries of the South, rather than to encourage free growth. Keet (2000) described how the structure of the WTO has enabled advanced countries to exploit weaknesses in developing countries as they have little experience in high-level negotiations and often do not recognize the value of their resources on a global scale. Douglas (2000) likened transnational corporate 'plundering' of developing countries to historical colonization activities. These scholars all have recognized that while globalization has changed the world, from the perspective of the South this change has been qualitatively different. In many cases, developing countries have not enjoyed the firm integrity of a national border since the beginning of trans-Atlantic trade in the 15th century (Mártin Alcoff, 2000; Held, McGrew, Goldblatt & Perraton, 1999).

The concept of globalization has spread from economics into other areas of the social sciences and humanities. It is now a commonly used term referring to the various manifestations of the increased "interdependence and interpenetration of human relations alongside the increasing integration of the world's socio-economic life" (Webster, 2002, p.68). The economic push to increase the interdependence and homogenization of markets has accelerated the consequences of this activity on the many other areas of existence. Lane (2006) outlined certain concerns including the meeting of future energy needs, the sustaining of the ecosystem, and the enforcing of human rights. He emphasized the necessity for a structured global governance to effectively manage these activities. This would entail a collaborative effort among nation-states, private corporations, non-governmental organizations and individuals (O'Brien & Williams, 2004). Further, it has been suggested that if a globalized society is to succeed, there must be an effort to establish common international norms, particularly with respect to security and peace (Kacowicz, 2005). Rudra (2007) added that global democracy will thrive if political and economic stability is ensured.

In recent globalization debates, proponents and critics have come to agreement on certain issues, such as the need to reduce poverty. Further, there has been recognition that information and ICTs must be an integral component of any proposed solution. If the developing world is to have a real opportunity to become equal partners in the global political economy, they must be able to negotiate the emerging information society.

Castells (2006) described the phenomenon of globalization as the rise of the network society. He noted that although ICTs have proliferated in the last decade, their diffusion has been uneven. He adds however, that while not all people have been directly interacting in networks, all people have been affected by their logic and the power relationships that result from them.

According to Webster (2002), "information has achieved a special pertinence in the contemporary world" (p. 2). During the later half of the twentieth century, the concept of an information society emerged in scholarly discussion and became part of the popular zeitgeist. Advances in technology brought about fundamental shifts in the ways that humans create, find, retrieve, share, store, and use information. This in turn, has impacted new developments in information technology. For some scholars, the product of this dialectic has been an increased complexity in the representations of information that must be managed intellectually (Cronin, 2000; Baudrillard, 1988) and transmitted physically (Latour, 2005; Kling, 2000).

Others however, look to the ways in which human activities and societal structure have been profoundly impacted by this shift; so much so that it has been suggested that civilization is entering a new technological revolution following on the heels of the industrial revolution (Bell, 1973; Duff, 2000). There have been objections to this claim; Webster (2002) contended that research thus far does not support the notion that people are engaging in activity that is fundamentally new. However, while the problems that human beings try to solve are not new, they have been made more urgent by the power of information technologies, which in turn, has affected all aspects of human life (Feather, 2004).

As more information has been created and shared, researchers have attended more keenly to the structure and quality of information flow. Phrases such as networked society, social networks, and communities of practice have become everyday parlance. The analysis of information networks has come to involve not only the physical aspects of message transmission, but also the social aspects. Scholars have been working in this area for several decades. Some have looked to the structure of relationships among nodes in a network, and the directional flow of information. Roger's (1962, 2003) diffusion of innovation theory, Milgram's (1967) study of small worlds and degrees of separation, and

Granovetter's (1973) social network theory of strong and weak ties, were early examples of this type of research. Actor Network Theory has been an emerging school of thought that considers all interaction among all bodies, animate or inanimate, as meaningful and necessary for a holistic understanding of the transmission of information. These interactions themselves may become agents transmitting information, revealing a new perspective on material-semiotics (Latour, 2005; Beagle, 2002; Law & Hassard, 1999).

Semiotics presents another theoretical lens through which scholars have viewed the information society. Research in this area has typically focused on the symbolic nature of information. Webster (2002) pointed out that as we live in an information-laden environment, we are constantly creating and interpreting symbols. Some have believed that this bombardment has led to less meaning to individuals (Baudrillard, 1988). However, there has been greater intermediate activity between the formulation of information and the reception of it, with the primary intent to distill meaning into intellectually-consumable chunks. The increased signification of metadata as an accompaniment to an informational representation has attested to this trend. Cronin (2000), for example, looked to abstractions of information found in a bibliographic record to explore symbolic activity among scholars. He warned however, that "references should not be dismissed as mere meta-textual baubles" (p. 447). As has happened in bibliographic analysis, the extraction and grouping of common words and concepts may remove them from a unique and meaningful context; relating contexts often reveals patterns with more interpretive value (Cronin, 2000).

Investigating the semiotic character of the academic citation is a means of understanding the changes taking place in the growth and exchange of formal academic knowledge. This type of knowledge has been referred to as theoretical knowledge and has been promoted as a means of unraveling the dynamics of modern society. Stehr (1994) argued that Bell's conception of theoretical knowledge was too rationalistic and constrained by scientific method. He pointed out that not all societies are molded by this type of logic and expanded the concept to distinguish it from practical or tacit knowledge; however, these types of knowledge tend to all work in concert. Much attention has been given to understanding change in this area because not only do more highly educated individuals turn to theoretical knowledge for personal decision making, but decision

making at the organizational or institutional level, representing the concerns of many and covering several potential eventualities, also rests on the more abstract and generalized forms of knowledge. Policy makers, business leaders, and others turn to theoretical knowledge to inform their decision making. However, Webster noted that while looking to theoretical knowledge is an interesting tack for conceptualizing an information society, it does not lend itself readily to either quantitative or qualitative operationalization (Webster, 2002).

Webster was not only skeptical of the existence of theoretical knowledge, but also of the very existence of an information society. He, nevertheless, devoted an entire book to the subject, offering multiple interpretations of influential thinkers. He presented the topic from five general perspectives: technological, occupational, spatial, and cultural, and argued that while all incorporate the suggestion that quantitative changes in information are bringing forth qualitative changes in society, none have been able to fully substantiate this claim. Further, he noted that little research has looked to the quality of information as an indicator of change. Other well-respected scholars, such as Gouldner, however, have been asserting for decades that humanity is undergoing transformational change. Gouldner (1976) noted early on that technology had not evolved in isolation and looked to the dialectic between ideology and technology. The iterative nature of technological developments with other aspects of society such as economics, politics and culture has also been addressed (Poster, 2006; Feenberg, 2002; Jacobs, 2001).

The structure of the interaction between humans and machines was the subject of Poster's (2006) *Information Please*. In general, the work focused on the intermingling of the material and the virtual, noting its repercussions on individual and collective identities. Invoking the theory of postmodern scholars such as Foucault, Bourdieu and Baudrillard, he analyzed the impact of media on culture and politics. He outlined the extensive recent activity in information policy and law, and the power structures rising to maintain or gain control of evolving technologies. Finally, using a Freudian model, Poster looked to the plasticity of the human body as it has adapted to technological change. He argued that this physical transformation, in turn, has propelled societal changes and the demand for new and different technologies.

Feenberg (2002) has also supported the co-emergence of technology and society through the application of critical theory. While he acknowledged that "technology provides the material framework of modernity," he rallied against the notion of technological determinism (p. 19). He argued that the often unbalanced social, economic and political arrangements are reinforced by modern technologies and place limits on the full potential of human development. For Feenberg, the control of technology represents power, power with the potential for abuse. Therefore, he urged critical scholars to apply reflective techniques to better comprehend the emergence of technologies and their implications for all of society, and to take action to balance the power that technology imparts.

Castells' influential trilogy on the topic of the information society has popularized the concept while infusing it with a Marxist flavor. In the first volume, *The rise of the network society, 2nd ed.* (2000a), he introduced the primary themes and historical development of the information society. His approach to interpreting socio-political changes leading to the network society was through a lens of material culture. Modes of production and consumption figured centrally in his discourse, as did the degradation of self identity. He elaborated on the theme of self identity in his second volume, *The power of identity, 2nd ed.* (2002). Identity in its many manifestations, such as cultural and religious, has motivated social movements. In a network society, the importance of geo-political boundaries has been reduced and network states emerge giving rise to moral challenges (Castels, 2002; Capurro, 2000). In the final volume, *End of a millennium, 2nd ed.* (2000b) Castells brought the two themes together to illuminate the processes of global social change induced by these forces. He introduced the concept of a fourth world, which includes those disenfranchised by the new information economy, but not necessarily confined within certain borders. He provocatively suggests that pockets of the United States are just as likely to be disenfranchised as are pockets of sub-Saharan Africa.

As is evident, several fields of study have undertaken research about the interaction between information and society. There has been a movement toward an interdisciplinary conversation on these topics called social informatics. According to Kling (2000) "social informatics is the new working name for the interdisciplinary study

of the design, uses, and consequences of information technologies that takes into account their interaction with institutional and cultural contexts" (p. 218). Research under this umbrella has been closely linked to human factors relating to technological development and has been highly applied in nature. However, empirical findings have yielded insights that contribute to intermediate-level theory. For instance, in an effort to identify the factors surrounding the acceptance of a digital journal by a group of scholars, it was discovered that its design as socio-technical interaction network determined its viability (Kling, 2000). This type of theory building has been essential for effectively linking situated problems to generalized solutions in a world that relies upon abstract knowledge for decision making.

2.4 Scholarly Communication and Bibliometrics

As we have entered an information age, an understanding of the movement and patterns of theoretical knowledge has become essential as it proliferates through global networks unevenly (Castells, 2006). Theoretical knowledge is embedded in the academic journal literature, which serves as the core of the formal scholarly communication process. Scholarly communication, in general, refers to "how scholars in any field…use and disseminate information through formal and informal channels" (Borgman, 1990, p. 13). Although scholarly resources are now shared through a variety of media, such as online collaboratories and scientific databases (Barjak, 2006; Lynch, 2006), since the 1660s, the most common medium of scholarly communication remains the peer-reviewed journal (Guédon, 2005). This means of formal communication includes reliable processes to ensure the peer-review, dissemination, and preservation of transactions, all of which are deemed essential to the integrity of the scholarly record (Rowlands, & Nicholas, 2005; Rowland, 2005; Swan, 2006). These processes directly involve multiple stakeholders, such as authors, publishers, librarians, and researchers; and indirectly involve stakeholders such as academic institutions, funding boards, policy makers, and the public. Societal and technological changes have increased the complexity and reach of this environment (Borgman & Furner, 2002).

Most of the literature on this topic from an information studies perspective has been situated in practice rather than in theory as stakeholders have attempted to make sense of

the changes brought forth by the information society and globalization. Borgman (2000) noted that scholarship is a social process, which in the modern environment, is embedded in a set of complex relationships. Due to the influences of "electronic publishing, digital libraries, computer networks and associated changes in pricing, intellectual property policies and contracts," these relationships have become unbalanced (p. 412). Since World War II, scientific research has proliferated and the volume of scholarly literature has grown. Society publishers who had traditionally provided peer-review and dissemination services became unable to handle the increase; independent for-profit publishers emerged to fill the need (Guédon, 2005). It was during this period that the dynamics of the scholarly communication environment began to change. Naturally, businesses used strategies to ensure the highest profit from the sale of their product. However, most scholars and librarians do not have a free-market orientation to scholarship (Cox, 2001).

While the entrance of for-profit publishing did not seem significant for several decades, the goals of private industry and the goals of other members of the scholarly community were eventually at odds. As such, the literature on the topic has been written from different perspectives. The library community was the first to begin the conversation about modern scholarly publishing. They were reacting to what has become known as the crisis in scholarly publishing or the serials crisis (Odlysko, 2006). During the 1970's and 1980's, the price of subscriptions to the literature, particularly scientific, technical and medical journals, increased at a rate outpacing inflation (King & Tenopir, 1998). This trend forced academic and research libraries to selectively choose among journal subscriptions, reducing the exposure of important research to the scholars at their institutions. It was much later that authors began feeling the impact of the serials crisis, as they were cushioned from soaring journal prices paid for by the library. It was not the crises in their own institutions that caught the attention of authors however; it was the global crisis (Houghton, 2002). The high subscriptions prices had effectively eliminated all but the wealthiest countries from participating in the scholarly dialog. This problem was particularly acute in the agricultural countries of the South where scholarly communication had just recently begun to emerge (Lor, 2006).

A response to the rising price of journal subscriptions has been the open access movement, which promotes the removal of financial barriers, and often legal barriers, associated with access to scholarly content (McCabe, & Snyder, 2006; Houghton, Steele, & Sheehan, 2006; Kaufmann-Wills Group, LLC., 2005; McCabe, 2004; Wellcome Trust, 2004; Wellcome Trust, 2003). This movement has had important consequences for researchers in the developing world where such content has enormous potential value. However, Feather (2004) argued that while information has value, that value is not necessarily intrinsic; its value is directly related to the ways in which it might be used. From these uses, advantages can be derived that are beneficial to the possessor of the information and which would not have been obtainable without it. If access to information is controlled, either financially or legally, the potential benefits of possessing it will be lost by those to whom it is denied. According to Feather (2004), these propositions underpin the concepts of 'information wealth' and 'information poverty' and their relationship to economic development (p. 115). Scholars, nation-states and civil society representatives have recognized that shifting the economic model of the scholarly journal from a proprietary good to a public good has the potential to profoundly impact the global research enterprise (Willinsky, 2006; King, 2005; Prosser, 2005).

Most scholarly content is not yet available through open-access channels however. While programs such as HINARI and AGORA have stepped in to fill this gap, providing access to the research literature is merely the first step in engaging the developing world in a scholarly dialog. Horton (2000) made the point that while content provision efforts to this end are worthwhile, they cannot be separated from a country's capacity for research and publication. He identified several barriers to information flow. Early technological barriers included small and poorly-resourced libraries, unreliable postal service, and limited ICTs. Cultural barriers include research ethics, lack of peer-group interaction, lack of investigatory spirit, lack of methodological training, lack of emphasis on publication, and language.

Beyond the practical developments in scholarly communication, there has been little reflection on its theoretical dimensions as it is typically discussed in the field of information studies. Borgman (2000) has identified researchers from other fields that have begun to abstract models. She pointed to Meadows, a communications scholar, who

has published frequently on the topic focusing on what scholars do and why as they engage in the various processes of scholarly communication. Lievrouw (1990), also with a background in communications, has looked to the structural elements of scholarly communication, such as networks of relationships among scholars. Many studies have been conducted to demonstrate such networks using bibliometric analyses (Borgman & Furner, 2002). Kling, McKim, and King (2003) demonstrated the concept of socio-technical interaction networks (STIN), providing a richer understanding of scholarly communication.

The measurement of scholarly communication however, has received tremendous attention in the field of library and information science. Bibliometrics, also referred to as scientometrics and informetrics, in particular, "offers a powerful set of methods and measures for studying the structure and process of scholarly communication" (Borgman, & Furner, 2002, p.2). Citation analysis is the most well known of the bibliometric approaches. In their guide to informetrics, Egghe and Rousseau (1990) provided a section which outlines the many ways in which citation data is used in research. Citation analysis has several applications, but is most often used to evaluate the impact of an author, institution, geographic region, article or journal. Relationships between entities may also be studied and mapped through co-citation analysis. Bibliometrics offers practical applications as well, such as determining journal use by specific populations. This is a type of citation analysis has been traditionally used by librarians to inform collection development.

The term "bibliometrics" was introduced by Alan Pritchard in 1969 as a replacement for the traditional terminology of "statistical bibliography" (Pritchard, 1969). Statistical bibliography had been explored for decades as a method of studying scientific literature to "illuminate the processes of communication, the factors which influence them, and the interrelationships between the history and sociology of a science and the literature of the science" (Pritchard in Drake, 2003, p. 295). Nalimov and Mulchenko introduced the term "scientometrics" in 1969 and it carried the same meaning as Pritchard's "bibliometrics". However, it was De Sola Price that established scientometrics through his study of the exponential growth of science and the half-life of scientific literature (Price 1963). In 1984, Brookes further developed the terminology in this field by using

“informetrics" to refer specifically to relations between laws or distributions. Almind and Ingwerson later gave the name “webometrics" to the applications of informetrics to web pages (Erar 2002).

The early years of statistical bibliography were characterized by several statistical laws. The most basic is Zipf’s Law, which predicts the frequency of words within a text. In any one relatively long text, if the words within that text are listed in order of decreasing frequency, the rank of a word on that list multiplied by its frequency will equal a constant (Zipf, 1949). This type of long-tail distribution is also demonstrated by Lotka's Law, which considers the frequency of publication by authors in a given field. Here, the number of authors contributing a certain frequency of publications (n) is 1/n^2 of those contributing one publication; and these single publication authors comprise about 60% of the total" (Lotka, 1926). In essence, according to Lotka's Law, only six percent of the authors in a field will produce more than 10 articles. In a more practical vein, Bradford's Law serves as a general guideline to librarians for identifying the core journals in any given field. Journals in any given field can be divided into three parts each containing the same number of articles: “1) a core of journals on the subject, relatively few in number, that produces approximately one-third of all the articles, 2) a second zone, containing the same number of articles as the first, but a greater number of journals, and 3) a third zone, containing the same number of articles as the second, but a still greater number of journals” (Potter, 1988).

Since the 1970s bibliometric indicators have been used to inform policy making. In the United States, *The Science and Engineering Indicators* published annually by the National Science Board gauge research output by tracking the number of academic papers published by groups of researchers. At the international level, the OECD looks to bibliometrics to better understand science and innovation in countries throughout the world and guide resource allocation and investment. It publishes the *Main Science and Technology Indicators* biennially, and the *Research and Development Statistics* in alternating years. In addition to counting research output, scientific activity is evaluated by counting the number of citations received, by estimating its impact based on citations received per paper, and by examining the number of co-authored papers (Katz, 2000). The Relative Citation Impact (RCI) indicator is a common measure that compares the

impact, or citations received per paper, published in a particular research area in one country's to all researchers worldwide in that research area. Katz (2000) found that the recognition that a group of researchers receives is directly related to the size, but non-linearly. It experiences a type of Matthew Effect as well as an inverse of the Matthew Effect. Specifically, as the size of the research communities increases, it receives exponentially more recognition and as it decreases it receives exponentially less recognition.

Citation analysis, in general, is a method of bibliometrics that examines the frequency and pattern of citations in articles and books. It uses citations to establish links to other researchers, articles or journals. It is the most common method of bibliometrics. Eugene Garfield, founder of the Institute for Scientific Information (ISI), has been credited with initiating the evaluative arm of citation analysis with his proposal of a scientific impact factor in 1955 (Garfield, 2006). In 1961, he published the first edition of the Science Citation Index, using the concept of the Journal Impact Factor (JIF) to identify source journals for the index. The JIF evaluates journals on the citations made to them rather than solely only their publication counts. This concept was later applied in the evaluation of authors and author groups. "Impact factor" has become increasingly important to institutions and scholars as it is used as a measure to determine institutional rankings, research funding awards, and faculty promotion and tenure (Borgman, 2007). Impact factors, however, have met with many critics who denounce their validity. Criticisms include: the ability to over cite one's own or a colleague's work; the quality of the citation could be critical rather than positive; the balanced weighting for the contributions of multi-authored papers; and the difference among disciplines regarding the time value of scholarly work (Borgman, 2007).

Other, less controversial, types of citation analyses exist. Co-citation analysis, for example, is used to map the topical relatedness of authors, author groups, articles, or journals (White & McCain, 1989). It has also been used to graph the intellectual structures within and among disciplines (White, & Griffith, 1981). A more traditional and practical type of citation study has been used by librarians for purposes of collection development. Borgman (1990) describes this technique quoting Raisig's early definition of bibliometrics as one of two of the most widely accepted: "the assembling and

interpretation of statistics relating to books and periodicals…to demonstrate historical movements, to determine the national or international use of books and journals, and to ascertain in many local situations the general use of books and journals." (p.13)

An emerging area in bibliometrics has been the field of webometrics, or cybermetrics. Webometrics uses bibliometric techniques to study the relationships among sites on the World Wide Web through their hyperlinks. Ingwersen (1998) introduced a measure called the Web Impact Factor (WIF). It looks to the number of web pages in a web site receiving links from other web sites, divided by the number of web pages published in the site that are accessible to a crawler. Such techniques are useful for understanding distributions of domains and links among web sites. Rousseau (2003) termed these types of relationships "sitations." These types of analyses would reveal areas of the World Wide Web that appear to be useful or influential, based on the number of times they are linked to other sites.

CHAPTER 3. RESEARCH METHODS

3.1 Introduction

This was a descriptive quantitative study that used bibliographic data for citations to examine the scholarly use of three sets of academic journals defined previously as the HINARI set, the AGORA set, and the Control set, by researchers in each of the eligible least-developed countries from the years 2000-2007. The citation measure used for this study was described by Egghe and Rousseau (1990) as "the use of local journal collections as measured by citations in theses and local study projects" (p. 289). Many librarians have used this technique to inform collection development (Atilgan & Bayram, 2006; Waugh & Ruppel, 2004; Gooden, 2001; Jacobs, Woodfield & Morris, 2000; Lightman & Manilov, 2000; Blecic, 1999; Crotteau, 1997; Zipp, 1996; Sylvia & Lesher, 1995; Triolo, & Bao, 1993; Mach, 1990; and McCain & Bobick, 1981). The premise that citations are valid indicators of journal use is supported by these and other studies (Todorov & Glanzel 1988).

The initial data for this study was obtained from several sources including Thomson's SCI and SSCI databases, as well as the HINARI and AGORA websites. These data were extensively prepared to facilitate analysis. The prepared data was then stored in a database called the LDC Citations Database, referring to "Least Developed Countries". The LDC Citations database contains three key tables: Country Authority, Title Authority, and Citation Data. Detailed instructions for preparing data and populating the LDC Citations database have been provided in Appendix B. Queries can be run that match citation data to title data, so that the frequency of citations made by a defined group of researchers within a specific time frame may be calculated for journals belonging to one of three sets: HINARI set, AGORA set and a Control set.

Data treatment proceeded in three parts. Firstly, citations were matched to the appropriate journal set and frequencies calculated. For this part, the frequency of citations to articles within these journal sets was the dependent variable and the independent variables were the time interval of one year and the geographic grouping of researchers. Secondly, the percent change in frequency of citations each year for each journal set was calculated for each geographic grouping. For this part, the percent change

in the frequency of citations to articles within these journal sets was the dependent variable and the independent variables were the time interval of one year and the geographic grouping of researchers. Graphs of the annual percent change in citation frequency to a journal set revealed patterns of use before and after the free availability of those journals as well as demonstrated differences in the annual percent change in citation frequency between the HINARI, AGORA and Control sets. Thirdly, average annual percent change in frequency of citations was calculated to enable comparison between time periods and between journal sets.

3.2 Research Questions

This study was inspired by the following overarching research questions.

- Have researchers from the eligible countries made greater scholarly use of the journals available through the HINARI and AGORA programs since their initiation, and has this use been greater than that of other journals which are not freely available through these two programs?
- Do regional and sub-regional aggregations of researchers from the eligible countries demonstrate variation in their use of the journals available through the HINARI and AGORA programs?

These broad research questions were explored by first calculating the frequency of citations to the three sets of journals from 2000-2007 for each country, sub-region and region, and then by calculating the percent change in frequency per year. Frequencies and percent change in frequency of citations were then analyzed to determine use patterns before and after program initiation for the HINARI set and the AGORA set. These patterns were then compared to those demonstrated by the Control set. The following questions guided the analysis.

Q1: Has the frequency of citations to articles published in journals contained in the HINARI set as reported by the SCI and SSCI increased each year from 2000-2007 for researchers from the least developed countries as grouped by nation, sub-region and region?

Q2: Has the frequency of citations to articles published in journals contained in the AGORA set as reported by the SCI and SSCI increased each year from 2000-2007 for

researchers from the least developed countries as grouped by nation, sub-region and region?

Q3: Has the frequency of citations to articles published in journals contained in the Control set as reported by the SCI and SSCI increased each year from 2000-2007 for researchers from the least developed countries as grouped by nation, sub-region and region?

Q4: Has the percent change in citations per year to articles published in journals contained in the HINARI set as reported by the SCI and SSCI increased each year from 2000-2007 for researchers from the least developed countries as grouped by nation, sub-region and region?

Q5: Has the percent change in citations per year to articles published in journals contained in the AGORA set as reported by the SCI and SSCI increased each year from 2000-2007 for researchers from the least developed countries as grouped by nation, sub-region and region?

Q6: Has the percent change in citations per year to articles published in journals contained in the Control set as reported by the SCI and SSCI increased each year from 2000-2007 for researchers from the least developed countries as grouped by nation, sub-region and region?

Q7: Is the average percent change in citations per year to articles published in journals contained in the HINARI set as reported by the SCI and SSCI from 2003-2007 greater than that from 2000-2002 for researchers from the least developed countries as grouped by nation, sub-region and region?

Q8: Is the average percent change in citations per year to articles published in journals contained in the HINARI set as reported by the SCI and SSCI from 2000-2007 greater than that of the Control set for researchers from the least developed countries as grouped by nation, sub-region and region?

Q9: Is the average percent change in citations per year to articles published in journals contained in the AGORA set as reported by the SCI and SSCI from 2004-2007 greater than that from 2000-2003 for researchers from the least developed countries as grouped by nation, sub-region and region?

Q10: Is the average percent change in citations per year to articles published in journals contained in the AGORA set as reported by the SCI and SSCI from 2000-2007 greater than that of the Control set for researchers from the least developed countries as grouped by nation, sub-region and region?
Q11: Is there regional variation with respect to the frequency of and percent change in citations per year to articles published in journals contained in the HINARI set as reported by the SCI and SSCI from 2000-2007?
Q12: Is there regional variation with respect to the frequency of and percent change in citations per year to articles published in journals contained in the AGORA set as reported by the SCI and SSCI from 2000-2007?

3.3 Unit of Analysis

The basic unit of analysis was a citation made to a journal article. Each of these is a unique citation made by a researcher associated with a specific geographic region within a specific year. Frequencies were calculated for these cited journal articles according to three criteria: geographic region of the author doing the citing, the year the citing takes place, whether the cited article is included in one of the journal sets. Q1, Q2, and Q3 look to these data for resolution. The frequency-of-citations calculations served as the foundation for the next phase of analysis.

The percent change in citation frequency per year was also calculated according to the above-outlined criteria. The percent change in frequency served as a secondary unit of analysis. Q4, Q5, and Q6 look to these data for resolution. These data are further manipulated to inform Q7, Q8, Q9 and Q10. In these cases, the average percent change in citation frequency according to a set of criteria was compared to the average percent change in citation frequency according to a different set of criteria. For instance, whether the average percent change in frequency of citations to the AGORA set was greater than that to the Control set over the period of the study.

3.4 Sample

Bibliographic data for the entire population of relevant citations were retrieved from the SCI and the SSCI. These indices are a part of a broader database environment called the ISI Web of Science, which is produced by Thomson Scientific. The SCI and SSCI do

not index all possible journals. However, they do contain the most influential international scientific and social-scientific titles and are widely considered to be the authoritative source for citation data. The indices contain article-level records for material published in academic journals and are indexed in such as manner to allow retrieval according to the author's nationality. The citations made within these articles are included with each record. The article-level records were retrieved in groups according to author nationality and year. Citation data were then extracted from these article sets and grouped according to citing author nationality and year.

The Citation Data table for the LDC Citations database contained 4,283,541 records. The records represented each citation made by researchers from the 106 eligible countries from 2000-2007. It should be noted that not all of the citation data extracted from the retrieved articles were included in the analysis. The citation data contained within each retrieved article record presents the citied journal title in its abbreviated form only. As will be described in greater detail in the following section, a match with the Title Authority file must take place on the abbreviated title field. If the Title Authority table did not contain a record with a match on this field, the citation was not included in the analysis.

3.5 Data Collection

The initial phase of this study required three distinct data sets containing information about countries, journal titles and citations. These data were ultimately stored in a Microsoft Access database named the LDC Citations database in tables called the Country Authority file, Title Authority file, and Citations Data file.

3.5.1 Country Authority

The data for the Country Authority table contains records for each of the least-developed countries as designated by the UN. This table included several fields, such as Country Name, Alternate Country Name, Previous Country Name, ISI Abbreviation, Sub-region, and Region. The primary designator was the Country Name as presented from the eligible countries lists on the HINARI and AGORA websites. These were not always the most common form of the country name however and so Alternate Country Name was added. Occasionally, when searching the SCI and SSCI, it became evident

that the country had changed its official name in the recent past. In these cases, it was necessary to search multiple country names as either the name change took place during the period of the study, or the indexers at Thomson had not completely transitioned to the new name. Regional and sub-regional geographical groups were assigned to each country according to distinctions outlined by the UN Statistics Division (UN Department of Economic and Social Affairs, 2007). Appendix A presents an outline of the information gathered for the Country Authority.

3.5.2 Title Authority

Several early attempts were made to compile a comprehensive and detailed Title Authority for this study. Resources included Ulrich's International Periodical Directory, SCI title list, SSCI title list, Web of Science abbreviated title list, the AGORA website and the HINARI website. Ideally, all of these lists would have been matched, sorted and de-duplicated according to the ISSN, which is the standard unique identifier for a journal title. However, not all of the sources provided the ISSN in their title lists. While having a comprehensive title list would have been useful for future research, it was not necessary for the effective completion of this study. Therefore, focus for building the Title Authority turned to which fields were essential for the execution of the query to determine frequency of citations to certain journal sets. As the bibliographic data for the citations contained only an abbreviated title to represent the journal being cited, the match between the Citation Data Table and the Title Authority Table had to occur on this field

The Thomson Web of Science Abbreviated Title list presents both the full title and the abbreviated title and was used to bridge the citation data (with abbreviated titles) and the title lists from the HINARI and AGORA websites (with full titles). To populate the Title Authority Table of the LDC Citations database, the three title lists were matched on their common field, the full title, and then de-duplicated on both the full title and the abbreviated title field. The fields resulting from this process were Title, Abbreviation, HINARI Inclusion and AGORA Inclusion. If the title was not included in either the HINARI set or the AGORA set, it was assigned to the Control set. The Control set therefore, contains the most authoritative scientific and social-scientific journals outside of the disciplines of life sciences and agriculture. The Title Authority Table contains

1,274 journals assigned to the HINARI set, 685 journals assigned to the AGORA set, and 14,410 journals assigned to the Control set. The data for this table were processed and organized according to the procedures outlined in Appendix B.

3.5.3 Citations Data

The data for the Citations Data set comes from the Science Citation Index and the Social Science Citation Index. These indices are a part of a broader database environment called Web of Science produced by Thomson Scientific. The indices contain article-level records with citation information. Queries requested records of feature articles authored by researchers from a certain country during a specific period of time. Usually the time period was one year as the results set was more easily managed. Initially, 864 queries were conducted; several more were conducted subsequently to verify improbable results. Results for each query were downloaded in batches of 500 records in a tab-delimited file formatted for Windows. These data files were then imported to Microsoft Excel spreadsheets.

Each of the article-level records that were downloaded contained multiple fields such as author country, journal title, article title, page numbers, and most importantly, citations (or references) made within the article. These citations data were contained in a common field and were extracted together. This new, extracted data set included the abbreviated journal title for the journal that was cited. Essential information was associated with the abbreviated journal title including the year that the citation was made and the country of origin of the author making the citation. These records were then imported into the LDC Citations database as the Citations Data Table. The fields for this table include the Cited Author, the Cited Year, the Cited Journal (Abbreviation), Citing Year, and Citing Country. The data for this table were processed and organized according to the procedures outlined in Appendix B.

3.6 Data Treatment

Twelve questions guided the analysis of the data. Each set of questions sequentially built upon the previous to bring greater insight into the scholarly journal use by the eligible researchers. As such, data treatment proceeded in three parts: to inform Q1-Q3, citations were matched to the appropriate journal set and frequencies calculated; to

inform Q4-Q6, the percent change in frequency of citations each year for each journal set was calculated for each geographic grouping; and to inform Q7-Q10, the average percent change in citation frequency according to a set of criteria was compared to the average percent change in citation frequency according to a different set of criteria. Q11 and Q12 look to variation among disaggregates of the data treated for Q1-Q10.

Firstly, citations were matched to the appropriate journal set and frequencies calculated. Using the LDC Citations Database, the Citations Data file was queried against the Title Authority file and the Country Authority file. The Data Treatment Query included the following fields: Region and Sub-region from the Country Authority Table, Country and Citing Year from the Citation Data Table, and HINARI Inclusion and AGORA Inclusion from the Title Authority Table. The criteria row was used to modify the parameters of the query. A query was run for each country, sub-region, and region to determine frequency of citations for each year to each of the three journal sets, resulting in 3,144 initial queries. The results from these queries were manually transferred to Excel Spreadsheets for analysis.

Secondly, the percent change in frequency of citations each year for each journal set was calculated for each geographic grouping. The Excel spreadsheets were set up in advance to automatically calculate and graph percent change. As frequency values were added to a Frequency of Citations Table in the spreadsheet, the percent change in frequency of citations appeared in an adjacent table called Percent Change in Frequency of Citations Table. Moreover, a chart and graph representing these data sets took shape. The rules used for these calculations are based on rate of change. To find the rate of change, one must first determine slope or momentum with (X2-X1)/(Y2-Y1). Since the time interval for these analyses was always 1, the denominator was dropped. This gave a real measure for the difference between the frequency counts from year to year. In order to make comparisons among the sets, these values were converted to annual percent change in frequency using the formula (X2-X1)/X1. The result was multiplied by 100 and discussed as annual percent change.

Thirdly, the annual percent change in frequency was further manipulated. Here averages were calculated for percent change in citation frequency according to a set of criteria and were compared to the average percent change in citation frequency according

to a different set of criteria. Specifically, the average annual percent change before the initiation of the programs was compared to the average annual percent change after the program; and the average annual percent change over the entire period of the study for the HINARI and AGORA sets was compared with the average annual percent change for the Control set. These calculations were also automated within the Excel worksheet.

3.7 Validity and Reliability

The content validity of this study is sound. Citation behavior is a well-established indicator of scholarly communication. If a journal has been cited, it may be assumed that it has been used. Scholars and librarians have employed citation measures extensively to demonstrate journal use. Nevertheless, it should be noted that other types of journal use that do not result in a citation behavior are possible. These include, but are not limited to browsing and reading (McCain & Bobick, 1981). Uses such as reading and browsing do not necessarily enhance scholarship. Since the HINARI and AGORA programs specifically intend to enhance scholarship, measuring use through citations was most appropriate. Although there are other types of journal use that may lead to the enhancement of scholarship, these dynamics are not addressed in this study.

Through extensive pilot testing, confounding factors that might have potentially compromised the internal validity of this study were identified and addressed through modifications in the research design. Firstly, it was decided to compare citations to HINARI and AGORA sets with citations to a Control set, rather than considering the citations to the HINARI and AGORA sets alone. The purpose of this comparison was to determine whether influencing variables are common to scholarship in all disciplines, or isolated to scholarship in the life sciences or agriculture. Since influencing factors common to all scholarship would be present in all sets of citations, any remaining proportional differences among the sets would not be a result of these common factors, but rather, influencing factors specific to the scholars targeted by the HINARI or AGORA programs.

Secondly, it was recognized that the inclusion of the HIANRI and AGORA titles in the Control set could potentially confound the results. Initially, the Control set included all titles indexed by the SCI and SSCI, including HIANRI and AGORA titles. If

included in the Control set, results may reflect any potential impacts by the programs, particularly if large proportion of the total citations made by any given group during any given time frame was to HINARI or AGORA titles. A situation like this would make it difficult to demonstrate a difference between the HINARI or AGORA sets and the Control set. Therefore, they were excluded from the Control set.

Finally, through careful documentation of procedures, every possible effort was made on the part of the researcher to ensure that this study may be duplicated by others. However, the reliability of the data obtained from other sources, both in terms of its accuracy and its permanency is beyond the control of the researcher (Vlachý, 1985). Access to the large amounts of information available through these sources outweighs the potential of error on the part of the vendor.

CHAPTER 4. SUMMARY OF REGIONAL RESULTS

4.1 Introduction

The results of this study are extensive and fully reported in Appendix C. Regional results are presented here. The twelve data-treatment questions are considered for each region. As an introduction, results for all eligible researchers, that is, all of the data collected for the study are presented first.

4.1.1 Data Representations for All Eligible Researchers

The following are the results for Q1 through Q10 for all eligible researchers, presented both graphically and textually.

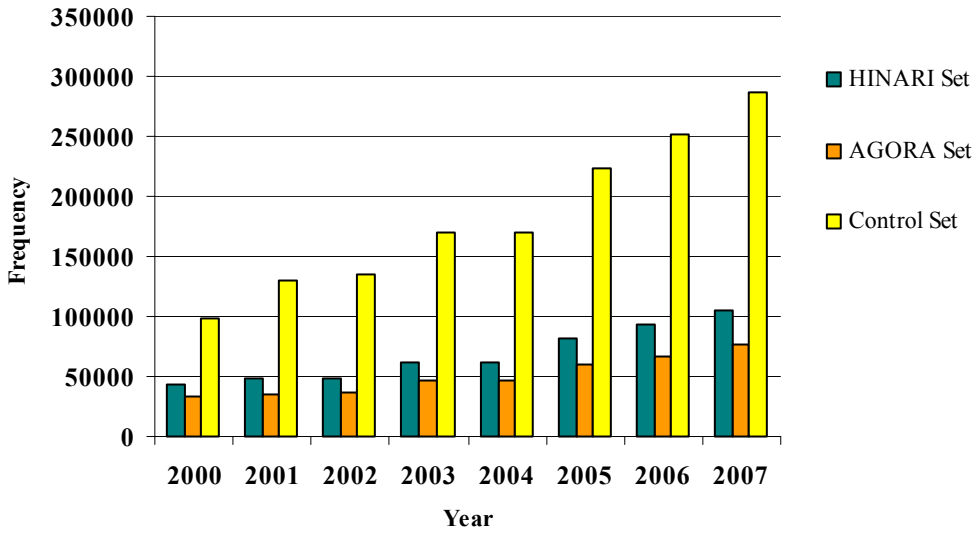


Figure 4.1 Frequency of Citations Made by All Eligible Researchers

As presented in Figure 4.1, the frequency of citations made by all eligible researchers to journals contained in the HINARI set increased each year from 2000-2007. However, the frequency of citations to the AGORA and Control sets did not increase for 2004.

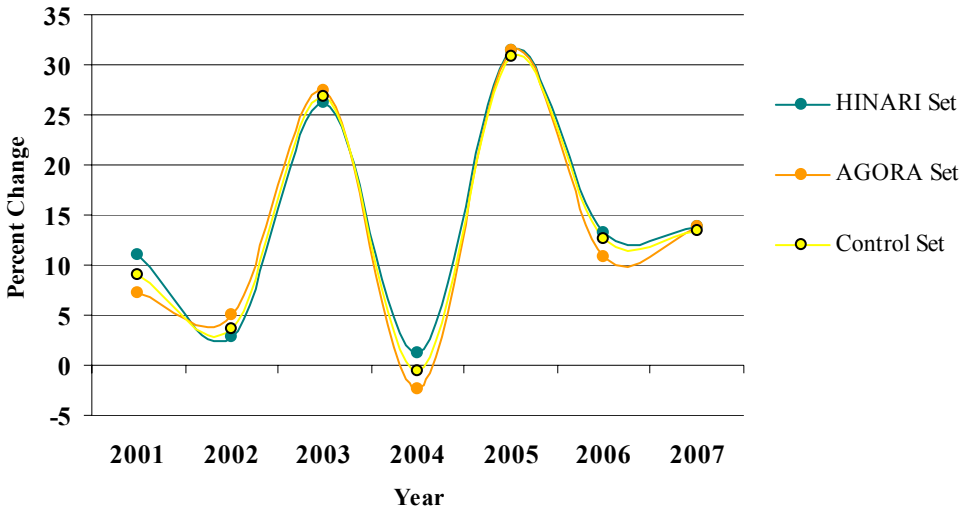


Figure 4.2 Percent Change in Frequency of Citations Made by All Eligible Researchers

As presented in Figure 4.2, the percent change in frequency of citations made by all eligible researchers to journals contained in the HINARI, AGORA and Control sets did not increase each year from 2001-2007.

Table 4.1 Average Percent Change in Frequency of Citations Made by All Eligible Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
10.2593	-2.9479	0.1634	-3.8505

The average annual percent change in frequency of citations made by all eligible researchers to journals contained in the HINARI set from 2003-2007 is greater than that from 2001-2002. The average annual percent change in frequency of citations made by all eligible researchers to journals contained in the HINARI set from 2001-2007 is not greater than that to journals contained in the Control set.

The average annual percent change in frequency of citations made by all eligible researchers to journals contained in the AGORA set from 2004-2007 is greater than that from 2001-2003. The average annual percent change in frequency of citations made by all eligible researchers to journals contained in the AGORA set from 2001-2007 is not greater than that to journals contained in the Control set.

4.1.2 Regional Comparisons for All Eligible Researchers

The following are the results for Q11 and Q12 for all eligible researchers, presented both graphically and textually.

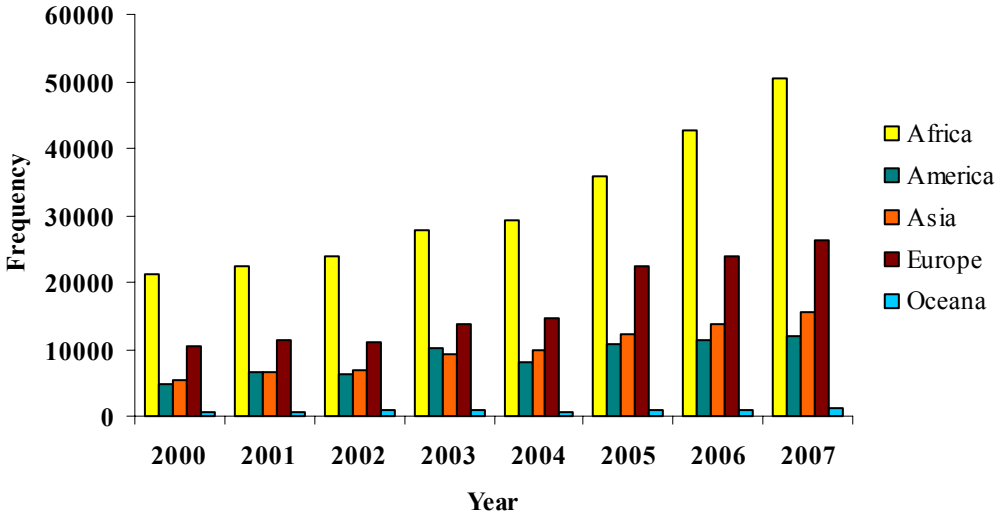


Figure 4.3 Frequency of Citations to HINARI Made by All Eligible Researchers

Figure 4.3 presents regional variation with respect to the frequency of citations per year to journals contained in the HINARI set.

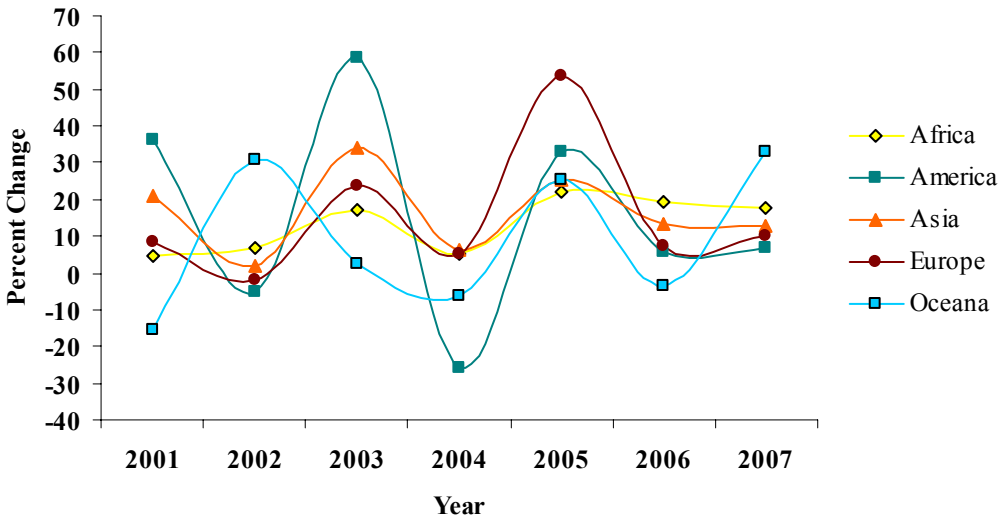


Figure 4.4 Percent Change in Citations to HINARI Made by All Eligible Researchers

Figure 4.4 reveals regional variation with respect to percent change in frequency of citations per year to journals contained in the HINARI set.

Table 4.2 Average Percent Change in Citations to HINARI Made by All Eligible Researchers

	HINARI Average 2001-2002	HINARI Average 2003-2007	HINARI Change Before-After	HINARI Average 2001-2007	Control Average 2001-2007	HINARI-Control Difference
Africa	5.6800	16.3438	10.6638	13.2970	10.1187	3.1784
America	15.5451	15.5817	0.0365	15.5712	10.5148	5.0565
Asia	11.6436	18.4347	6.7911	16.4944	10.4163	6.0780
Europe	3.3619	20.0372	16.6753	15.2728	10.1954	5.0774
Oceana	7.6271	10.1302	2.5031	9.4150	7.8689	1.5462

Table 4.2 shows regional variation with respect to the average percent change in frequency before and after the initiation of the program. While all five regions demonstrate positive change, there is a range of 16.6% between the smallest change and greatest change. For the entire period of the study, all five regions reveal a greater average annual percent change in frequency to the HINARI set than to the Control set, but with a range of 4.5% between the smallest change and the greatest change.

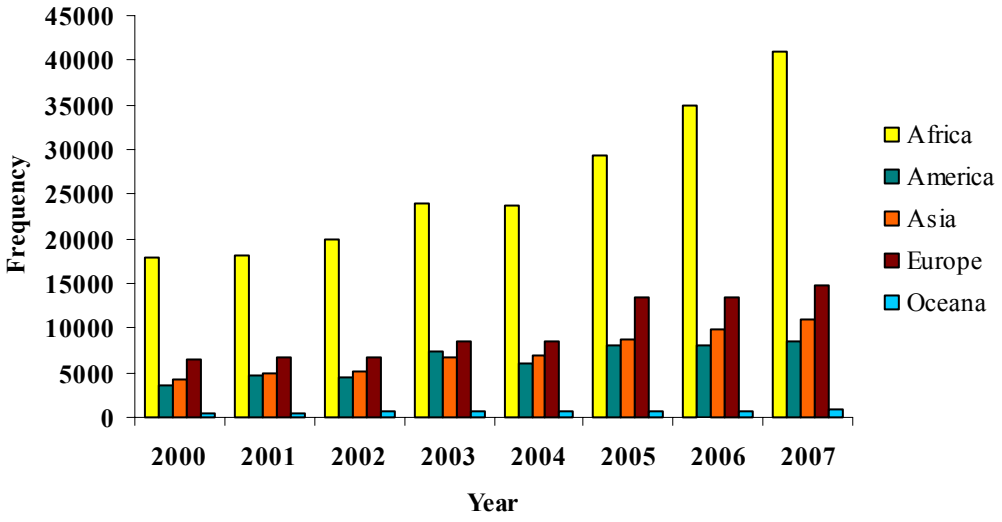


Figure 4.5 Frequency of Citations to AGORA Made by All Eligible Researchers

Figure 4.5 presents regional variation with respect to the frequency of citations per year to journals contained in the AGORA set.

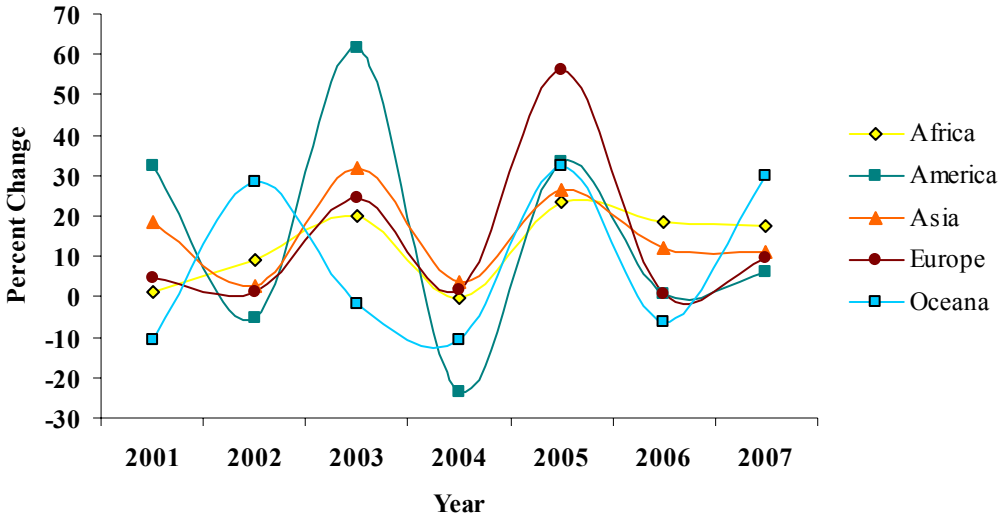


Figure 4.6 Percent Change in Citations to AGORA Made by All Eligible Researchers

Figure 4.6 reveals regional variation with respect to the percent change in frequency of citations per year to journals contained in the AGORA set.

Table 4.3 Average Percent Change in Citations to AGORA Made by All Eligible Researchers

	AGORA Average 2001-2003	AGORA Average 2004-2007	AGORA Change Before-After	AGORA Average 2001-2007	Control Average 2001-2007	AGORA-Control Difference
Africa	10.1395	14.7474	4.6079	12.7726	10.1187	2.6539
America	29.6135	4.2912	-25.3223	15.1436	10.5148	4.6289
Asia	17.8027	13.2100	-4.5927	15.1783	10.4163	4.7619
Europe	9.9895	17.0049	7.0154	13.9983	10.1954	3.8029
Oceana	5.4309	11.4690	6.0381	8.8813	7.8689	1.0124

Table 4.3 demonstrates regional variation with respect to the average annual percent change in frequency before and after the initiation of the AGORA program, with three regions demonstrating positive change and two demonstrating negative change. For the entire period of the study, all five of the regions reveal a greater average annual percent

change in frequency to the AGORA set than to the Control set, but with a range of 3.8% between the smallest change and greatest change.

4.1.3 Results Summary by Region for All Eligible Researchers

Table 4.4 summarizes the regional results for the twelve questions used to guide data treatment.

Table 4.4 Results Summary by Region

	Africa	America	Asia	Europe	Oceana
Q1: Has the frequency of citations to the HINARI set increased each year?	Y	N	Y	N	N
Q2: Has the frequency of citations to the AGORA set increased each year?	N	N	Y	Y	N
Q3: Has the frequency of citations to the Control set increased each year?	Y	N	Y	N	N
Q4: Has the percent change in frequency of citations to the HINARI set increased each year?	N	N	N	N	N
Q5: Has the percent change in frequency of citations to the AGORA set increased each year?	N	N	N	N	N
Q6: Has the percent change in frequency of citations to the Control set increased each year?	N	N	N	N	N
Q7: Is the average percent change in frequency of citations to the HINARI set from 2003-2007 greater than that from 2000-2002?	Y	Y	Y	Y	Y
Q8: Is average percent change in frequency of citations to the HINARI 2000-2007 greater than that of the Control set?	Y	Y	Y	Y	Y

Table 4.4 - Continued

	Africa	America	Asia	Europe	Oceana
Q9: Is average percent change in frequency of citations to the AGORA set from 2004-2007 greater than that from 2000-2003?	Y	N	N	Y	Y
Q10: Is average percent change in citations to the AGORA 2000-2007 greater than that to the Control set?	Y	Y	Y	Y	Y
Q11: Is there regional variation with respect to the frequency of and percent change in frequency of citations to the HINARI set?	Y	Y	Y	Y	Y
Q12: Is there regional variation with respect to the frequency of and percent change in frequency of citations to the AGORA set?	Y	Y	Y	Y	Y

4.2 Africa

4.2.1 Data Representations for Africa

The following are the results for Q1 through Q10 for researchers in eligible African countries, presented both graphically and textually.

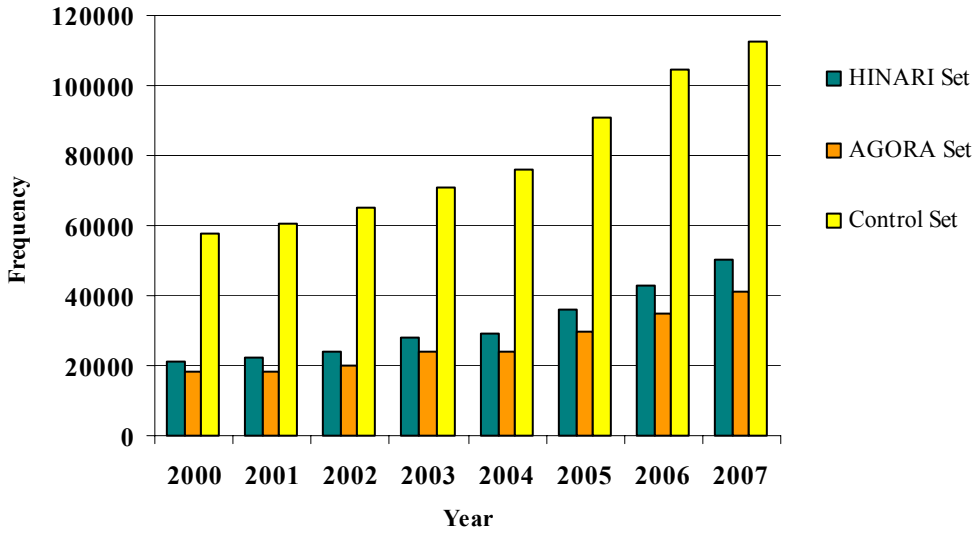


Figure 4.7 Frequency of Citations Made by Eligible African Researchers

As presented in Figure 4.7, the frequency of citations made by eligible African researchers to journals contained in the HINARI and Control sets increased each year from 2000-2007. The frequency of citations made to journals contained in the AGORA set did not increase each year.

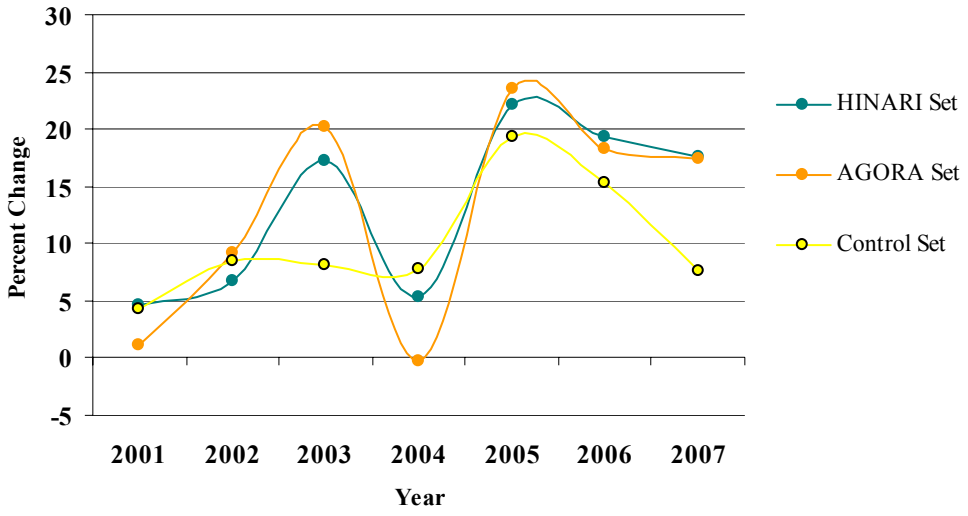


Figure 4.8 Percent Change in Frequency of Citations Made by Eligible African Researchers

As presented in Figure 4.8, the percent change in frequency of citations made by eligible African researchers to journals contained in the HINARI, AGORA and Control sets did not increase each year from 2001-2007.

Table 4.5 Average Percent Change in Frequency of Citations Made by Eligible African Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
10.6638	3.1784	4.6079	2.6539

As revealed in Table 4.5, the average annual percent change in frequency of citations made by eligible African researchers to journals contained in the HINARI set from 2003-2007 is greater than that from 2001-2002. The average percent change in frequency of citations made by eligible African researchers to journals contained in the HINARI set from 2001-2007 is greater than that to journals contained in the Control set.

Table 4.5 also shows that the average percent change in frequency of citations made by eligible African researchers to journals contained in the AGORA set from 2004-2007 is greater than that from 2001-2003. The average percent change in frequency of citations made by eligible African researchers to journals contained in the AGORA set from 2001-2007 is greater than that to journals contained in the Control set.

4.2.2 African Sub-regional Comparisons

The following are the results for Q11 and Q12 for researchers in eligible African countries, presented both graphically and textually.

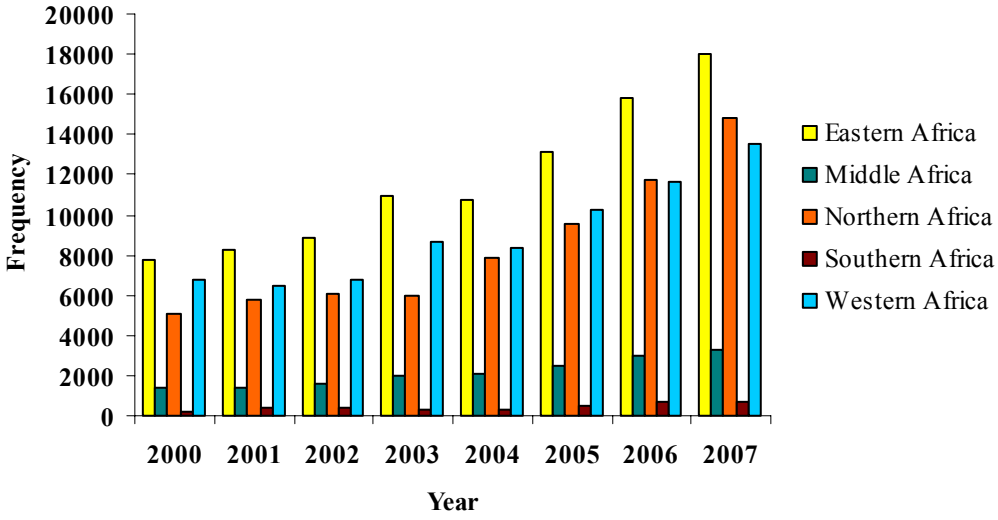


Figure 4.9 Frequency of Citations to HINARI Made by Eligible African Researchers

Figure 4.9 presents sub-regional variation with respect to the frequency of citations per year to journals contained in the HINARI set.

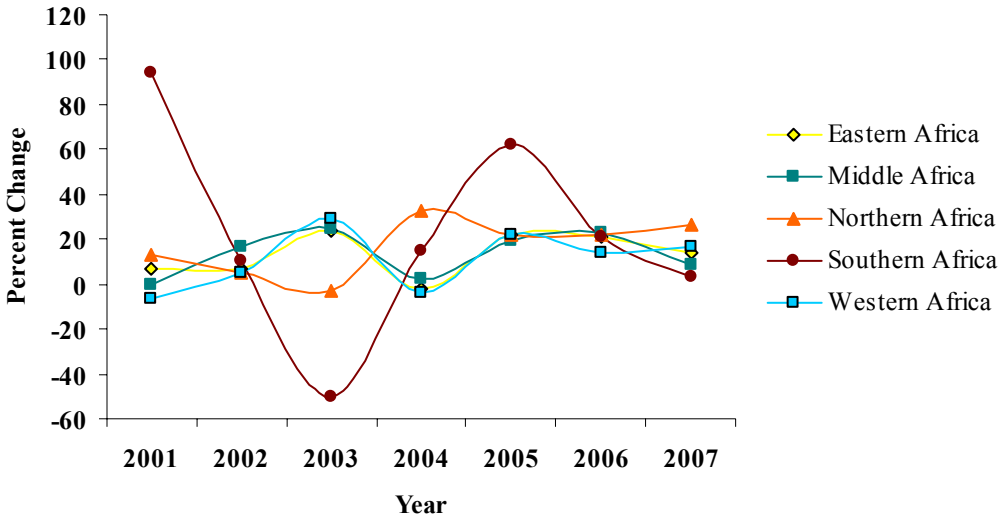


Figure 4.10 Percent Change in Citations to HINARI Made by Eligible African Researchers

Figure 4.10 reveals sub-regional variation with respect to percent change in frequency of citations per year to journals contained in the HINARI set.

Table 4.6 Average Percent Change in Citations to HINARI Made by Eligible African Researchers

	HINARI Average 2001-2002	HINARI Average 2003-2007	HINARI Change	HINARI Average 2001-2007	Control Average 2001-2007	HINARI-Control Difference
Eastern Africa	6.8435	15.6056	8.7621	13.1022	8.5582	4.5439
Middle Africa	8.3091	15.4547	7.1455	13.4131	1.9194	11.4937
Northern Africa	9.2727	20.1105	10.8378	17.0140	11.8366	5.1774
Southern Africa	52.4805	10.0998	-42.3807	22.2086	27.6951	-5.4865
Western Africa	-0.4830	15.4901	15.9732	10.9264	9.0913	1.8351

Table 4.6 describes sub-regional variation with respect to the average percent change in frequency before and after the initiation of the program. Four sub-regions demonstrate positive change and one demonstrates negative change. For the entire period of the study, four sub-regions reveal a greater average annual percent change in frequency to the HINARI set than to the Control set and one reveals a greater average change to the Control set than to the HINARI set.

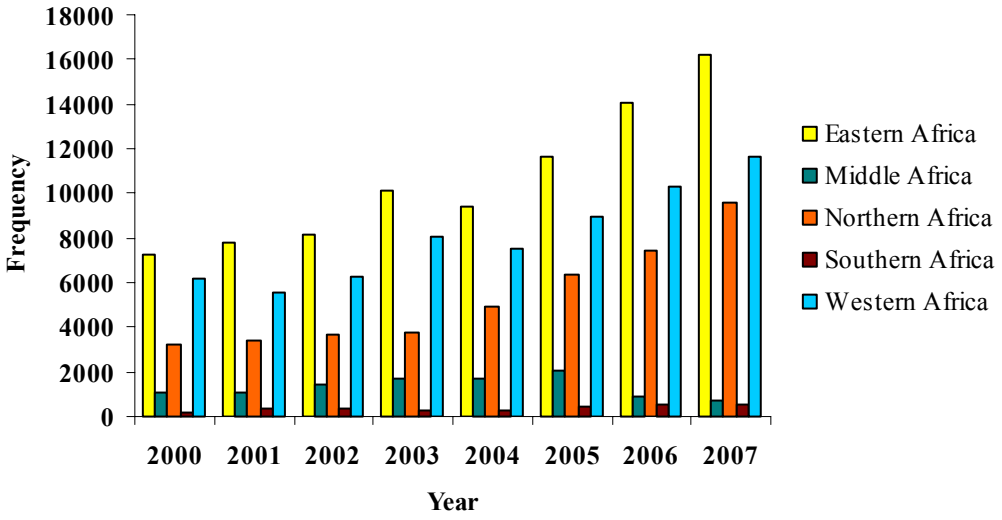


Figure 4.11 Frequency of Citations to AGORA Made by Eligible African Researchers

Figure 4.11 shows sub-regional variation with respect to the frequency of citations per year to journals contained in the AGORA set.

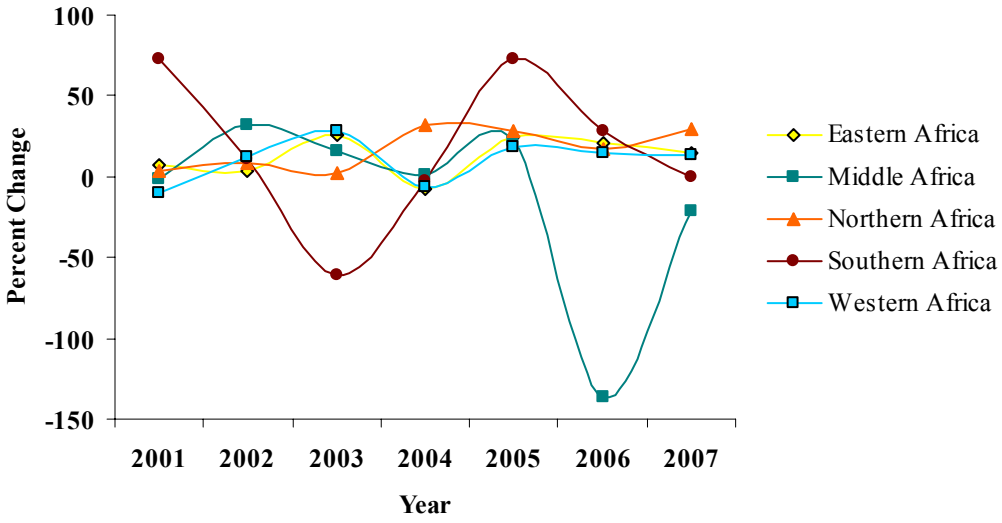


Figure 4.12 Percent Change in Citations to AGORA Made by Eligible African Researchers

Figure 4.12 reveals sub-regional variation with respect to the frequency of and percent change in citations per year to journals contained in the AGORA set.

Table 4.7 Average Percent Change in Citations to AGORA Made by Eligible African Researchers

	AGORA Average 2001-2003	AGORA Average 2004-2007	AGORA Change	AGORA Average 2001-2007	Control Average 2001-2007	AGORA-Control Difference
Eastern Africa	12.1319	12.8976	0.7657	12.5694	8.5582	4.0112
Middle Africa	15.8374	-33.8410	-49.6785	-12.5503	1.9194	-14.4696
Northern Africa	4.7015	26.6832	21.9817	17.2625	11.8366	5.4259
Southern Africa	7.0644	24.7104	17.6459	17.1478	27.6951	-10.5472
Western Africa	10.1689	10.1090	-0.0598	10.1347	9.0913	1.0434

Table 4.7 demonstrates sub-regional variation with respect to the average percent change in frequency before and after the initiation of the AGORA program, with three sub-regions demonstrating positive change and two demonstrating negative change. For the entire period of the study, three sub-regions reveal a greater average annual percent change in frequency to the AGORA set than to the Control set and two reveal a greater average change to the Control set than to the AGORA set.

4.2.3 Results Summary by African Sub-regions

Table 4.24 summarizes the African sub-regional results for the twelve questions used to guide data treatment.

Table 4.8 Results Summary by African Sub-regions

	Eastern Africa	Middle Africa	Northern Africa	Southern Africa	Western Africa
Q1: Has the frequency of citations to the HINARI set increased each year?	N	N	N	N	N
Q2: Has the frequency of citations to the AGORA set increased each year?	N	N	Y	N	N
Q3: Has the frequency of citations to the Control set increased each year?	N	N	N	N	N

Table 4.8 - Continued

	Eastern Africa	Middle Africa	Northern Africa	Southern Africa	Western Africa
Q4: Has the percent change in frequency of citations to the HINARI set increased each year?	N	N	N	N	N
Q5: Has the percent change in frequency of citations to the AGORA set increased each year?	N	N	N	N	N
Q6: Has the percent change in frequency of citations to the Control set increased each year?	N	N	N	N	N
Q7: Is the average percent change in frequency of citations to the HINARI set from 2003-2007 greater than that from 2000-2002?	Y	Y	Y	N	Y
Q8: Is average percent change in frequency of citations to the HINARI 2000-2007 greater than that of the Control set?	Y	Y	Y	N	Y
Q9: Is average percent change in frequency of citations to the AGORA set from 2004-2007 greater than that from 2000-2003?	Y	N	Y	Y	N
Q10: Is average percent change in citations to the AGORA 2000-2007 greater than that to the Control set?	Y	N	Y	N	Y
Q11: Is there regional variation with respect to the frequency of and percent change in frequency of citations to the HINARI set?	Y	Y	Y	Y	Y
Q12: Is there regional variation with respect to the frequency of and percent change in frequency of citations to the AGORA set?	Y	Y	Y	Y	Y

4.3 America

4.3.1 Data Representations for America

The following are the results for Q1 through Q10 for researchers in eligible American countries, presented both graphically and textually.

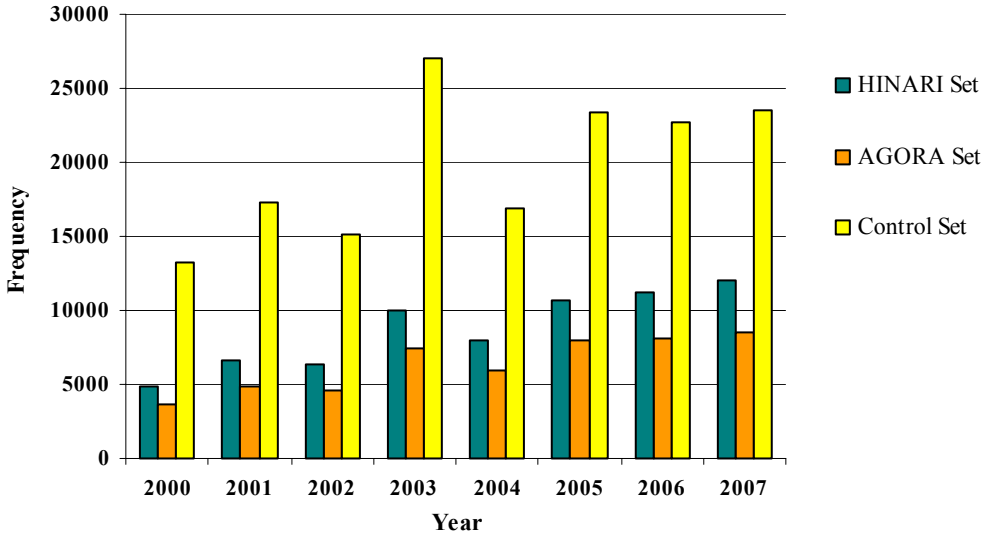


Figure 4.13 Frequency of Citations Made by Eligible American Researchers

As presented in Figure 4.13, the frequency of citations made by eligible American researchers to journals contained in the HINARI, AGORA and Control sets did not increase each year from 2000-2007.

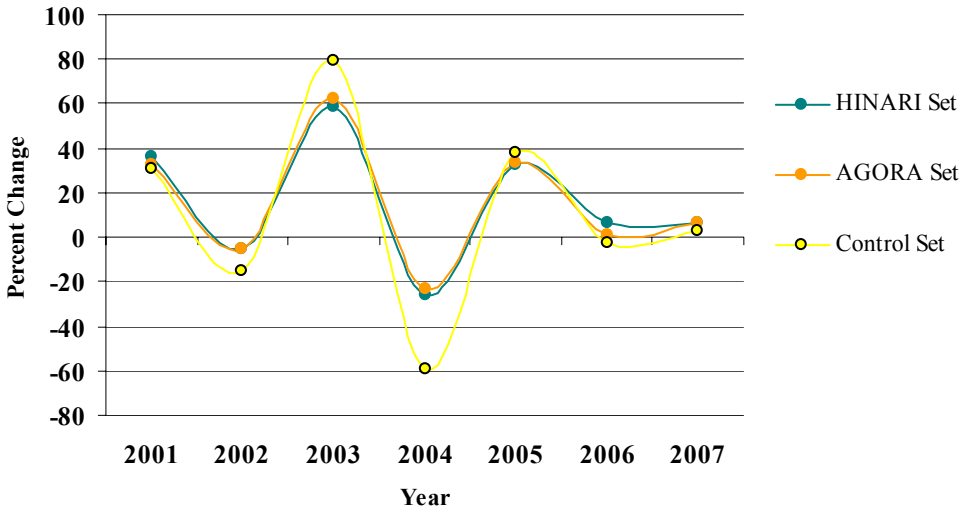


Figure 4.14 Percent Change in Frequency of Citations Made by Eligible American Researchers

As presented in Figure 4.14, the percent change in frequency of citations made by eligible American researchers to journals contained in the HINARI, AGORA and Control sets did not increase each year from 2001-2007.

Table 4.9 Average Percent Change Made by Eligible American Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
0.0365	5.0565	-25.3223	4.6289

Table 4.9 reveals that the average annual percent change in frequency of citations made by eligible American researchers to journals contained in the HINARI set from 2003-2007 is greater than that from 2001-2002. The average percent change in frequency of citations made by eligible American researchers to journals contained in the HINARI set from 2001-2007 is greater than that to journals contained in the Control set.

Table 4.9 also reveals that the average percent change in frequency of citations made by eligible American researchers to journals contained in the AGORA set from 2004-2007 is not greater than that from 2001-2003. The average percent change in frequency of citations made by eligible American researchers to journals contained in the AGORA set from 2001-2007 is greater than that to journals contained in the Control set.

4.3.2 American Sub-regional Comparisons

The following are the results for Q11 and Q12 for researchers in eligible American countries, presented both graphically and textually.

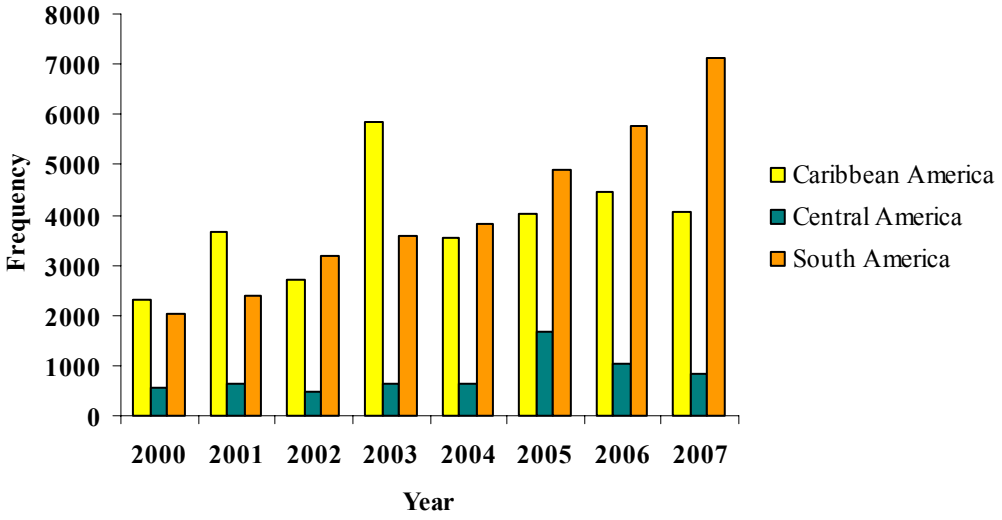


Figure 4.15 Frequency of Citations to HINARI Made by Eligible American Researchers

Figure 4.15 shows sub-regional variation with respect to the frequency of citations per year to journals contained in the HINARI set.

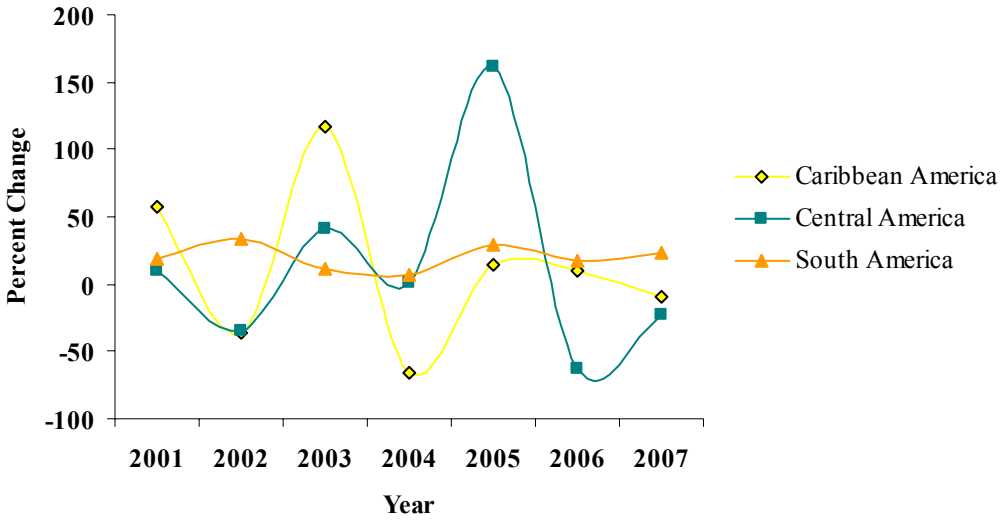


Figure 4.16 Percent Change in Citations to HINARI Made by Eligible American Researchers

Figure 4.16 reveals sub-regional variation with respect to percent change in frequency of citations per year to journals contained in the HINARI set.

Table 4.10 Average Percent Change in Citations to HINARI Made by Eligible American Researchers

	HINARI Average 2001-2002	HINARI Average 2003-2007	HINARI Change Before-After	HINARI Average 2001-2007	Control Average 2001-2007	HINARI-Control Difference
Caribbean America	10.6378	13.2185	2.5807	12.4811	7.8291	4.6520
Central America	-196.060	23.1196	219.1802	-39.5033	15.5274	-55.0306
South America	26.3456	17.5755	-8.7701	20.0813	12.8077	7.2735

Table 4.10 shows sub-regional variation with respect to the average annual percent change in frequency before and after the initiation of the program, with two sub-regions demonstrating positive change and one showing negative change. For the entire period of the study, two sub-regions reveal a greater average annual percent change in frequency of citations to the HINARI set than to the Control set and one shows a greater average percent change in citation frequency to the Control set than to the HINARI set.

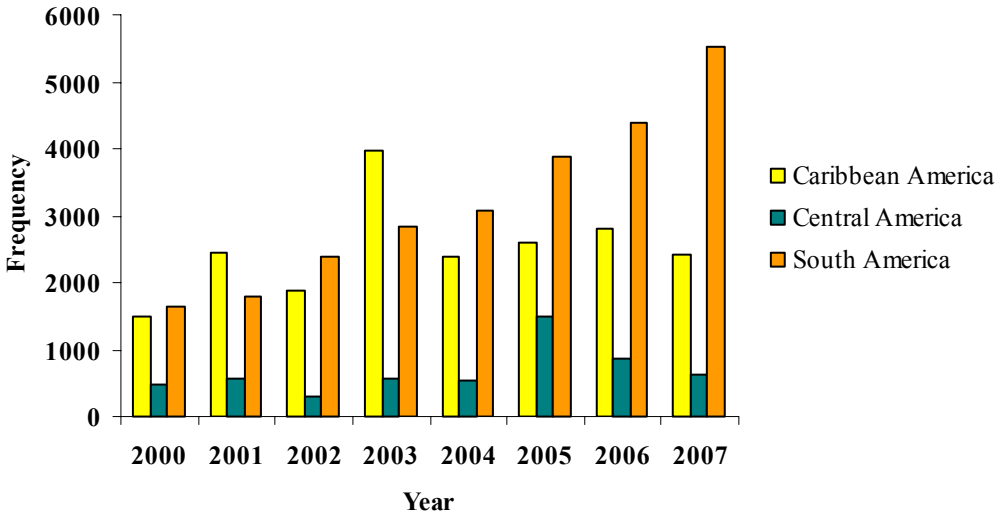


Figure 4.17 Frequency of Citations to AGORA Made by Eligible American Researchers

Figure 4.17 shows sub-regional variation with respect to the frequency of citations per year to articles published in journals contained in the AGORA Set.

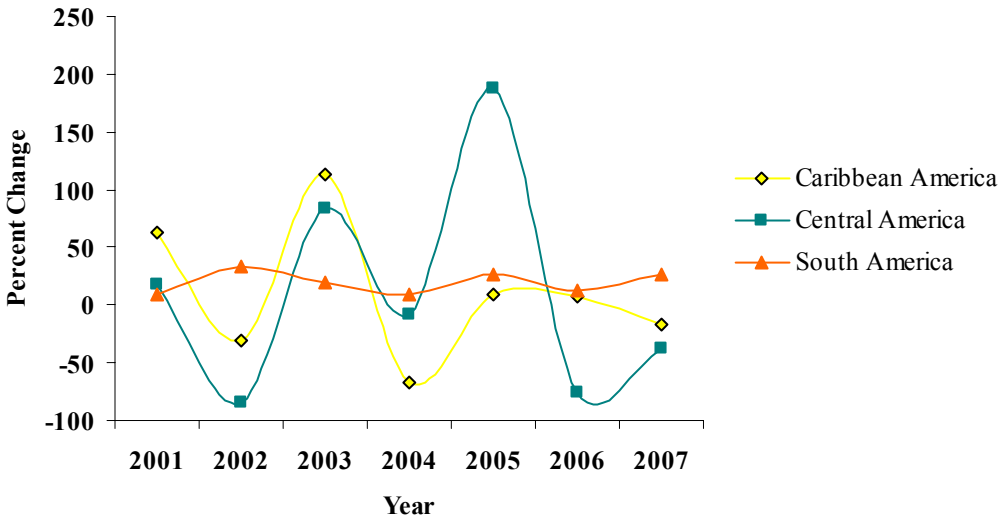


Figure 4.18 Percent Change in Citations to AGORA Made by Eligible American Researchers

Figure 4.18 reveals sub-regional variation with respect to the percent change in citations per year to articles published in journals contained in the AGORA set.

Table 4.11 Average Percent Change in Citations to AGORA Made by Eligible American Researchers

	AGORA Average 2001-2003	AGORA Average 2004-2007	AGORA Change Before-After	AGORA Average 2001-2007	Control Average 2001-2007	AGORA-Control Difference
Caribbean America	48.2227	-16.5658	-64.7886	11.2007	7.8291	3.3716
Central America	6.0797	16.9781	10.8984	12.3073	15.5274	-3.2200
South America	20.2684	18.3122	-1.9562	19.1506	11.6986	12.8077

Table 4.11 demonstrates sub-regional variation with respect to the average annaul percent change in frequency before and after the initiation of the AGORA program, with two sub-regions demonstrating negative change and one showing positive change. For the entire period of the study, two sub-regions reveal a greater average annual percent change in frequency of citations to the AGORA set than to the Control Set and one reveals a greater average annual percent change in frequency citations to the Control set.

4.3.3 Results Summary for American Sub-regions

Table 4.12 summarizes the American sub-regional results for the twelve questions used to guide data treatment.

Table 4.12 Results Summary for Eligible American Researchers

	Caribbean America	Central America	South America
Q1: Has the frequency of citations to the HINARI set increased each year?	N	N	Y
Q2: Has the frequency of citations to the AGORA set increased each year?	N	N	Y
Q3: Has the frequency of citations to the Control set increased each year?	N	N	N

Table 4.12 - Continued

	Caribbean America	Central America	South America
Q4: Has the percent change in frequency of citations to the HINARI set increased each year?	N	N	N
Q5: Has the percent change in frequency of citations to the AGORA set increased each year?	N	N	N
Q6: Has the percent change in frequency of citations to the Control set increased each year?	N	N	N
Q7: Is the average percent change in frequency of citations to the HINARI set from 2003-2007 greater than that from 2000-2002?	Y	Y	N
Q8: Is average percent change in frequency of citations to the HINARI 2000-2007 greater than that of the Control set?	Y	N	Y
Q9: Is average percent change in frequency of citations to the AGORA set from 2004-2007 greater than that from 2000-2003?	N	Y	N
Q10: Is average percent change in citations to the AGORA 2000-2007 greater than that to the Control set?	Y	N	Y
Q11: Is there regional variation with respect to the frequency of and percent change in frequency of citations to the HINARI set?	Y	Y	Y
Q12: Is there regional variation with respect to the frequency of and percent change in frequency of citations to the AGORA set?	Y	Y	Y

4.4 Asia

4.4.1 Data Representations for Asia

The following are the results for Q1 through Q10 for researchers from eligible Asian countries, presented both graphically and textually.

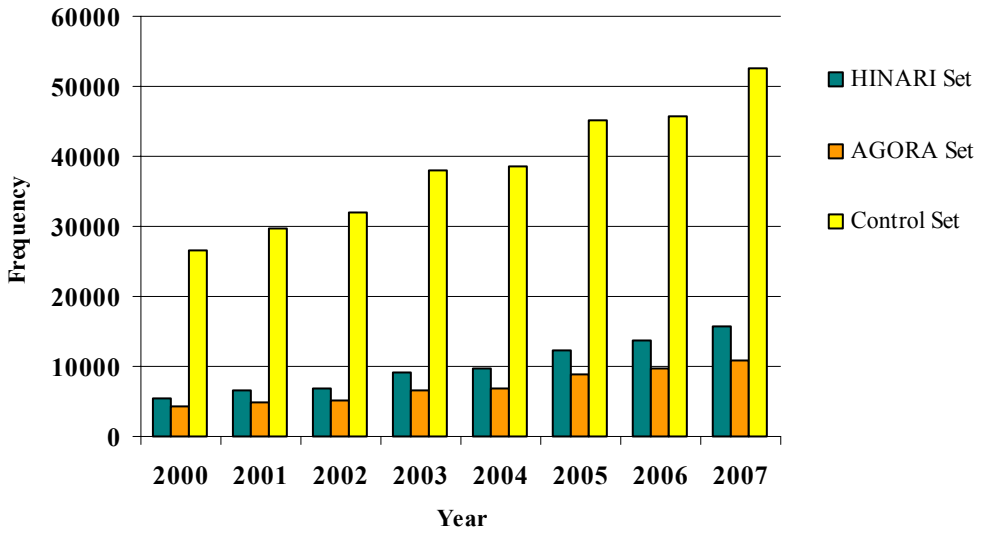


Figure 4.19 Frequency of Citations Made by Eligible Asian Researchers

As presented in Figure 4.19, the frequency of citations made by eligible Asian researchers to journals contained in the HINARI, AGORA and Control sets increased each year from 2000-2007.

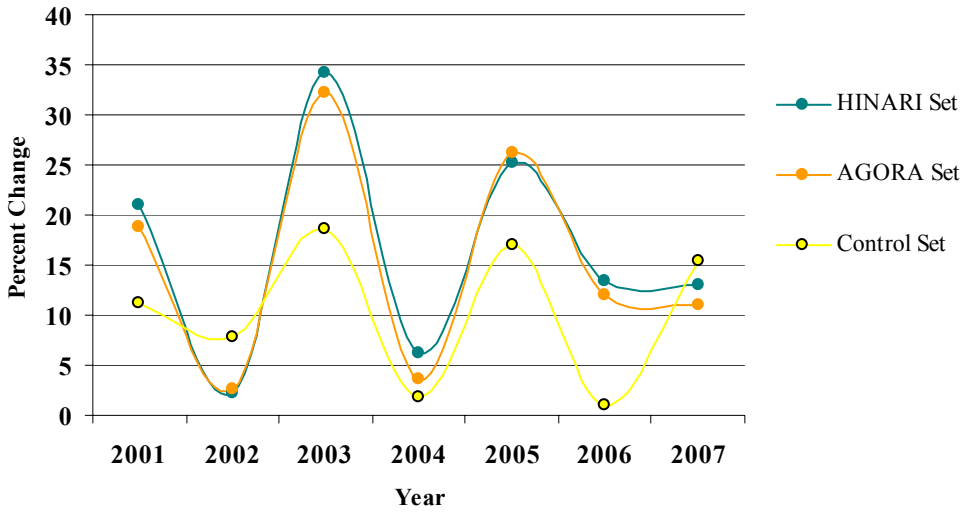


Figure 4.20 Percent Change in Frequency of Citations Made by Eligible Asian Researchers

As presented in Figure 4.20, the percent change in citations made by eligible Asian researchers to journals contained in the HINARI, AGORA and Control sets did not increase each year from 2001-2007.

Table 4.13 Average Percent Change in Frequency of Citations Made by Eligible Asian Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
6.7911	6.0780	-4.5927	4.7619

Table 4.13 reveals that the average percent change made by eligible Asian researchers to journals contained in the HINARI set from 2003-2007 is greater than that from 2001-2002. The average percent change in frequency of citations made by eligible Asian researchers to journals contained in the HINARI set from 2001-2007 is greater than that to journals contained in the Control set.

Table 4.13 also shows that the average percent change in frequency of citations made by eligible Asian researchers to journals contained in the AGORA set from 2004-2007 is not greater than that from 2001-2003. The average percent change in frequency of

citations made by eligible Asian researchers to journals contained in the AGORA set from 2001-2007 is greater than that to journals contained in the Control set.

4.4.2 Asian Sub-regional Comparisons

The following are the results for Q11 and Q12 for researchers from eligible Asian countries, presented both graphically and textually.

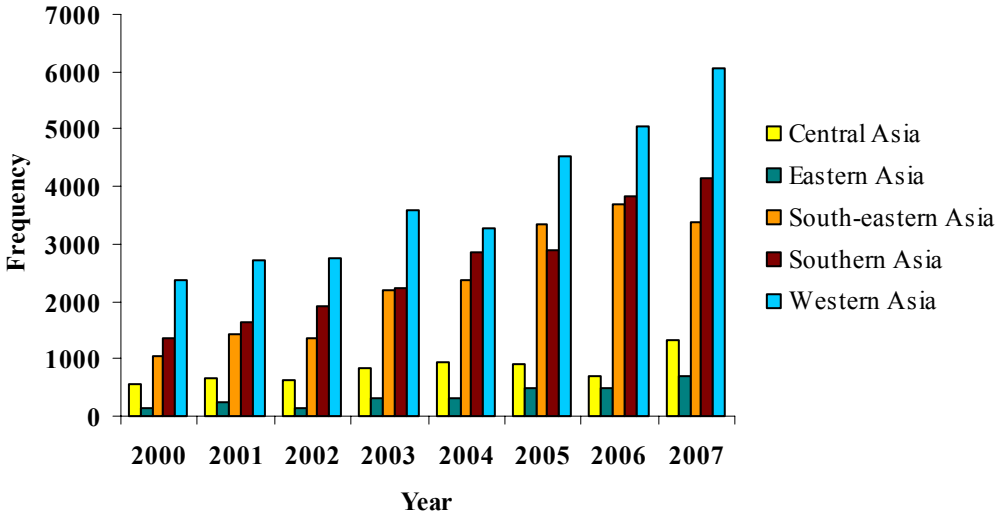


Figure 4.21 Frequency of Citations to HINARI Made by Eligible Asian Researchers

Figure 4.21 shows sub-regional variation with respect to the frequency of citations per year to articles published in journals contained in the HINARI set.

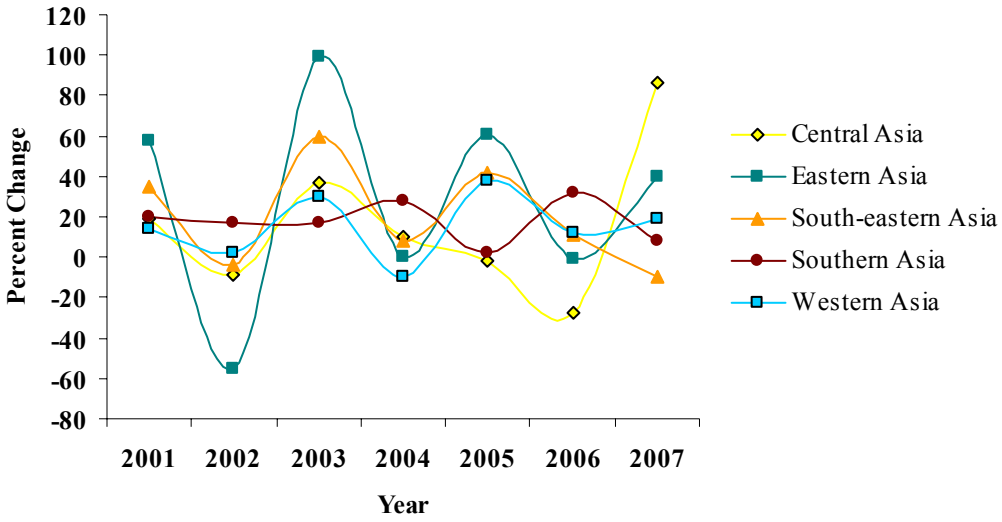


Figure 4.22 Percent Change in Citations to HINARI Made by Eligible Asian Researchers

Figure 4.22 reveals sub-regional variation with respect to percent change in frequency of citations per year to articles published in journals contained in the HINARI set.

Table 4.14 Average Percent Change in Citations to HINARI Made by Eligible Asian Researchers

	HINARI Average 2001-2002	HINARI Average 2003-2007	HINARI Change	HINARI Average 2001-2007	Control Average 2001-2007	HINARI-Control Difference
Central Asia	5.1766	20.7215	15.5449	16.2801	15.3319	0.9482
Eastern Asia	1.5280	39.6988	38.1708	28.7928	19.0196	9.7732
South-eastern Asia	15.2673	22.1881	6.9208	20.2107	11.8930	8.3177
Southern Asian	18.8038	17.3615	-1.4424	17.7736	11.2428	6.5308
Western Asia	7.9281	17.9168	9.9886	15.0629	10.3469	4.7160

Table 4.14 shows sub-regional variation with respect to the average percent change in frequency before and after the initiation of the program, with four sub-regions demonstrating positive change and one demonstrating negative change. For the entire period of the study, all five regions reveal a greater average annual percent change in frequency to the HINARI set than to the Control set, but with a range of 8.8% between the smallest change and the greatest change.

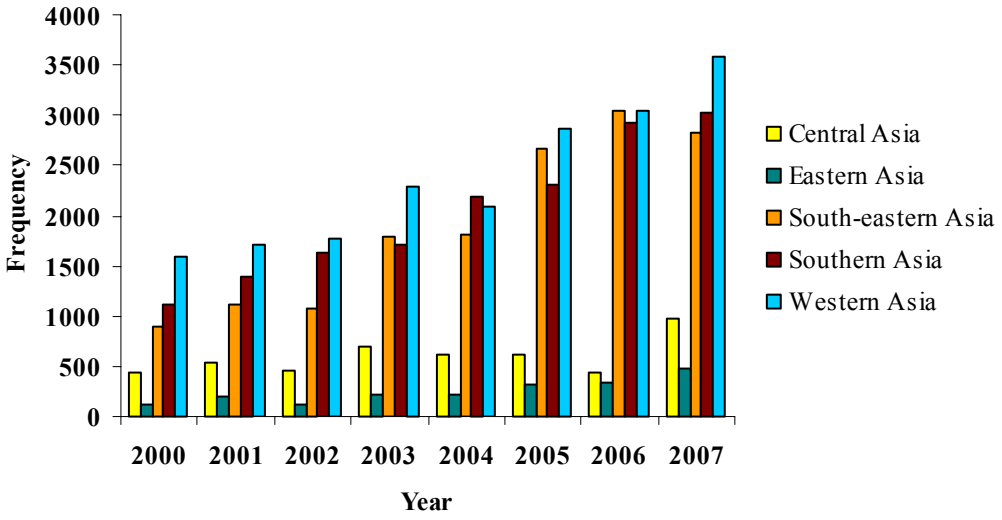


Figure 4.23 Frequency of Citations to AGORA Made by Eligible Asian Researchers

Figure 4.23 shows sub-regional variation with respect to the frequency of citations per year to journals contained in the AGORA set.

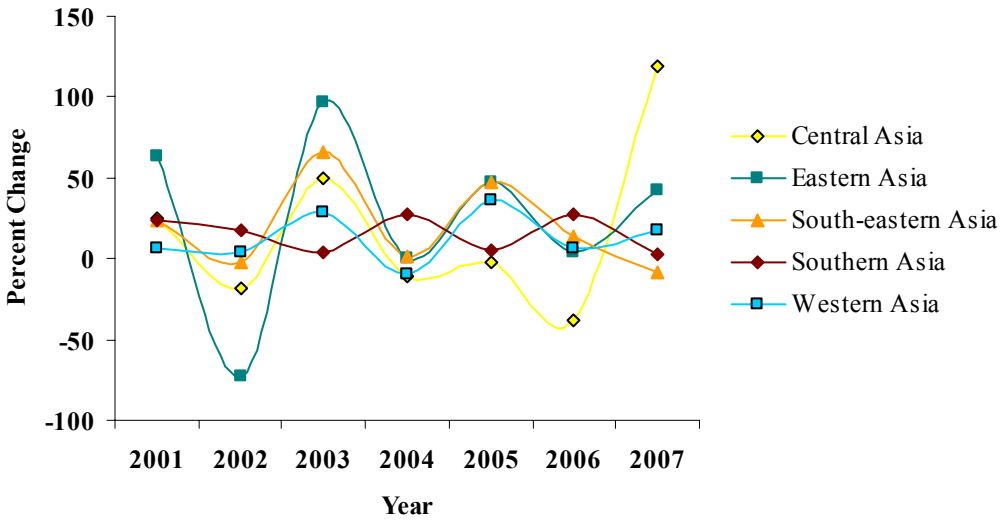


Figure 4.24 Percent Change in Citations to AGORA Made by Eligible Asian Researchers

Figure 4.24 reveals sub-regional variation with respect to the percent change in citations per year to journals contained in the AGORA set.

Table 4.15 Average Percent Change in Citations to AGORA Made by Eligible Asian Researchers

	AGORA Average 2001-2003	AGORA Average 2004-2007	AGORA Change	AGORA Average 2001-2007	Control Average 2001-2007	AGORA-Control Difference
Central Asia	18.9437	17.1897	-1.7540	17.9414	15.3319	2.6095
Eastern Asia	28.7465	23.1847	-5.5618	25.5683	19.0196	6.5487
South-eastern Asia	28.9295	13.6743	-15.2553	20.2122	11.8930	8.3193
South Asian	15.3796	16.0409	0.6614	15.7575	11.2428	4.5147
Western Asia	13.4056	12.8466	-0.5589	13.0862	10.3469	2.7393

Table 4.15 demonstrates sub-regional variation with respect to the average annual percent change in frequency of citations before and after the initiation of the AGORA program, with four sub-regions demonstrating negative change and one demonstrating positive change. For the entire period of the study, all five sub-regions reveal a greater average annual percent change in frequency of citations to the AGORA set than to the Control set, but with a range of 5.7% between the smallest change and the greatest change.

4.4.3 Results Summary for Asian Sub-regions

Table 4.16 summarizes the Asian sub-regional results for the twelve questions used to guide data treatment.

Table 4.16 Results Summary for Eligible Asian Researchers

	Central Asia	Eastern Asia	South-eastern Asia	Southern Asia	Western Asia
Q1: Has the frequency of citations to the HINARI set increased each year?	N	N	N	Y	N
Q2: Has the frequency of citations to the AGORA set increased each year?	N	N	N	Y	N
Q3: Has the frequency of citations to the Control set increased each year?	N	N	N	N	N

Table 4.16 - Continued

	Central Asia	Eastern Asia	South-eastern Asia	Southern Asia	Western Asia
Q4: Has the percent change in frequency of citations to the HINARI set increased each year?	N	N	N	N	N
Q5: Has the percent change in frequency of citations to the AGORA set increased each year?	N	N	N	N	N
Q6: Has the percent change in frequency of citations to the Control set increased each year?	N	N	N	N	N
Q7: Is the average percent change in frequency of citations to the HINARI set from 2003-2007 greater than that from 2000-2002?	Y	Y	Y	N	Y
Q8: Is average percent change in frequency of citations to the HINARI 2000-2007 greater than that of the Control set?	Y	Y	Y	Y	Y
Q9: Is average percent change in frequency of citations to the AGORA set from 2004-2007 greater than that from 2000-2003?	N	N	N	Y	N
Q10: Is average percent change in citations to the AGORA 2000-2007 greater than that to the Control set?	Y	Y	Y	Y	Y
Q11: Is there regional variation with respect to the frequency of and percent change in frequency of citations to the HINARI set?	Y	N	Y	Y	Y
Q12: Is there regional variation with respect to the frequency of and percent change in frequency of citations to the AGORA set?	Y	N	Y	Y	Y

4.5 Europe

4.5.1 Data Representations for Europe

The following are the results for Q1 through Q10 for researchers in eligible European countries, presented both graphically and textually.

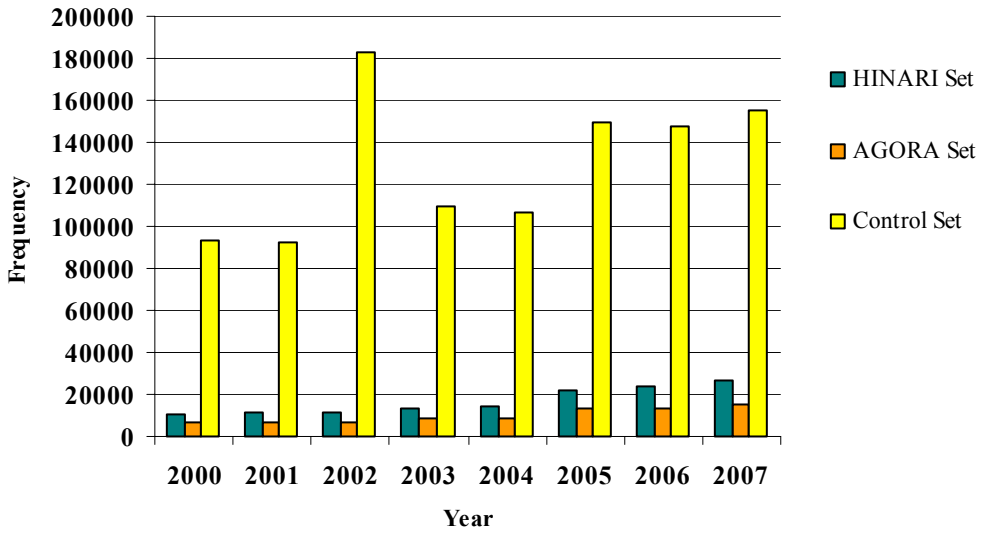


Figure 4.25 Frequency of Citations Made by Eligible European Researchers

As presented in Figure 4.25, the frequency of citations made by eligible European researchers to journals contained in the HINARI and Control sets did not increase each year from 2000-2007. However, the frequency of citations made by eligible European researchers to journals contained in the AGORA set increased each year from 2000-2007.

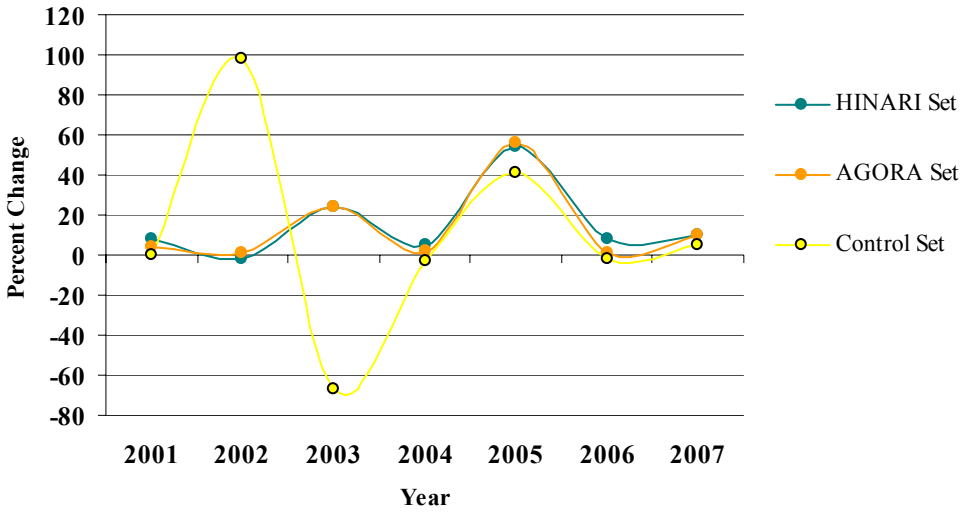


Figure 4.26 Percent Change in Frequency of Citations Made by Eligible European Researchers

As presented in Figure 4.26, the percent change in the frequency of citations made by eligible European researchers to journals contained in the HINARI, AGORA and Control sets did not increase each year from 2001-2007.

Table 4.17 Average Percent Change in Frequency of Citations Made by Eligible European Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
16.6753	5.0774	7.0154	3.8029

Table 4.17 reveals that the average percent change in frequency of citations made by eligible European researchers to journals contained in the HINARI set from 2003-2007 is greater than that from 2001-2002. The average percent change in frequency of citations made by eligible European researchers to journals contained in the HINARI set from 2001-2007 is greater than that to journals contained in the Control set.

Table 4.17 also reveals that the average percent change in frequency of citations made by eligible European researchers to journals contained in the AGORA set from 2004-2007 is greater than that from 2001-2003. The average percent change made by eligible

European researchers to journals contained in the AGORA set from 2001-2007 is greater than that to journals contained in the Control set.

4.5.2 European Sub-regional Comparisons

The following are the results for Q11 and Q12 for researchers in eligible European countries, presented both graphically and textually.

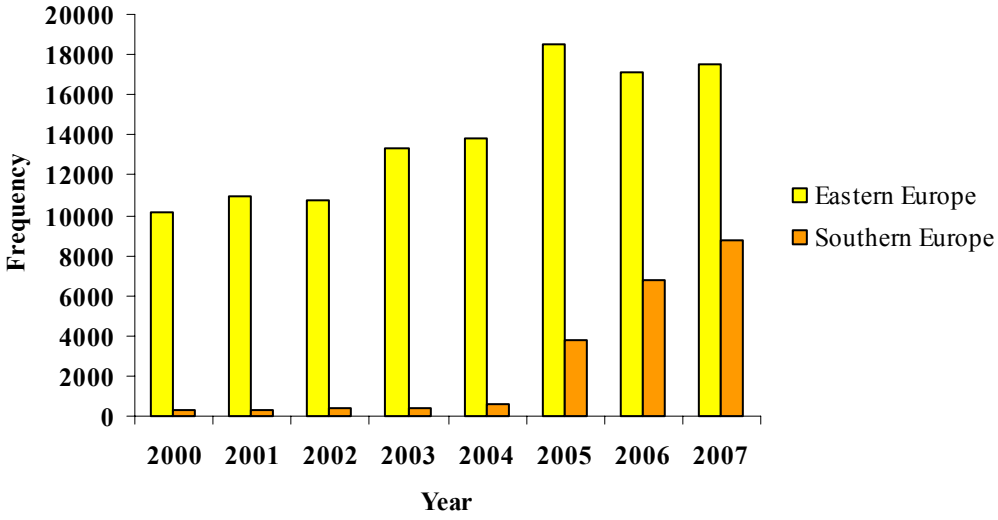


Figure 4.27 Frequency of Citations to HINARI Made by Eligible European Researchers

Figure 4.27 shows sub-regional variation with respect to the frequency of citations per year to journals contained in the HINARI set.

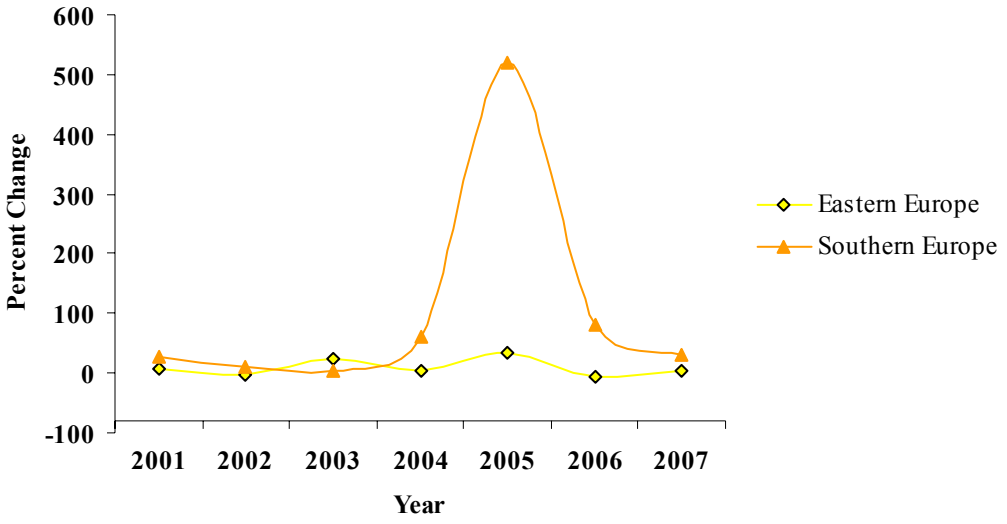


Figure 4.28 Percent Change in Citations to HINARI Made by Eligible European Researchers

Figure 4.28 reveals sub-regional variation with respect to percent change in frequency of citations per year to journals contained in the HINARI set.

Table 4.18 Average Percent Change in Citations to HINARI Made by Eligible European Researchers

	HINARI Average 2001-2002	HINARI Average 2003-2007	HINARI Change	HINARI Average 2001-2007	Control Average 2001-2007	HINARI-Control Difference
Eastern Europe	2.9448	11.1481	8.2033	8.8043	4.9761	3.8282
Southern Europe	18.2885	138.8256	120.5370	104.3864	86.5199	17.8665

Table 4.18 shows sub-regional variation with respect to the average percent change in frequency of citations before and after the initiation of the HINARI program. While both sub-regions demonstrate positive change, there is a range of 112% between the smaller change and the greater change. For the entire period of the study, both sub-regions reveal a greater average annual percent change in frequency to the HINARI set than to the Control Set, but with a range of 14% between the smaller change and the greater change.

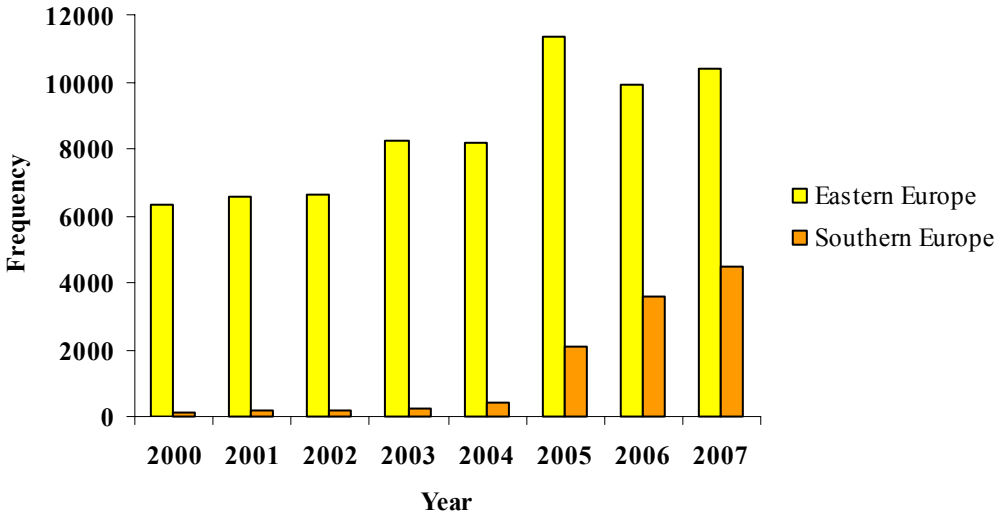


Figure 4.29 Frequency of Citations to AGORA Made by Eligible European Researchers

Figure 4.29 shows sub-regional variation with respect to the frequency of citations per year to journals contained in the AGORA Set.

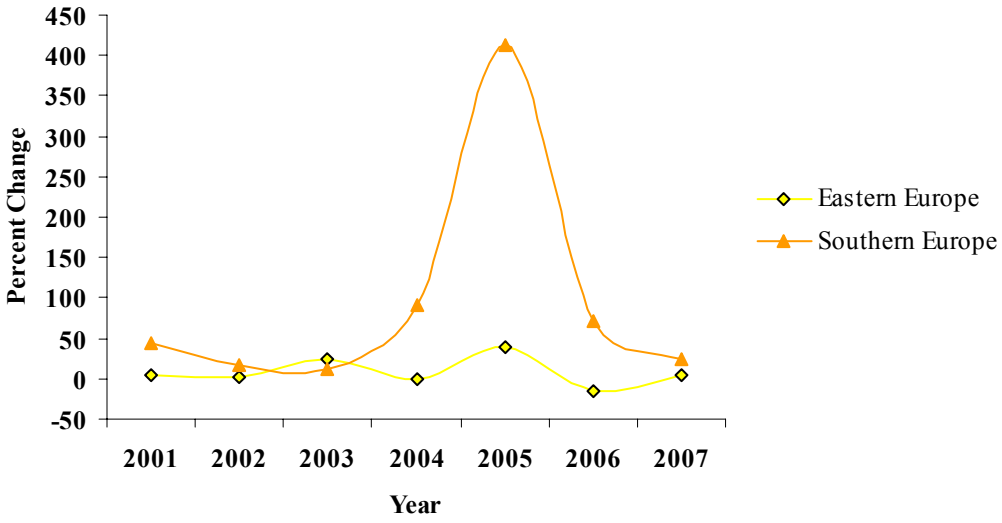


Figure 4.30 Percent Change in Citations to AGORA Made by Eligible European Researchers

Figure 4.30 reveals sub-regional variation with respect to the percent change in frequency of citations per year to journals contained in the AGORA set.

Table 4.19 Average Percent Change in Citations to AGORA Made by Eligible European Researchers

	AGORA Average 2001-2003	AGORA Average 2004-2007	AGORA Change	AGORA Average 2001-2007	Control Average 2001-2007	AGORA-Control Difference
Eastern Europe	9.7374	6.9824	-2.7550	8.1632	4.9761	3.1870
Southern Europe	24.5509	149.4827	124.9318	95.9405	86.5199	9.4206

Table 4.19 demonstrates sub-regional variation with respect to the average annual percent change in frequency of citations before and after the initiation of the AGORA program, with one sub-region showing negative change and one showing positive change. For the entire period of the study, both sub-regions reveal a greater average annual percent change in frequency of citations to the AGORA set than to the Control set, but with a range of 6.2% between the smaller change and the greater change.

4.5.3 Results Summary for European Sub-regions

Table 4.20 summarizes the European sub-regional results for the twelve questions used to guide data treatment.

Table 4.20 Results Summary for Eligible European Researchers

	Eastern Europe	Southern Europe
Q1: Has the frequency of citations to the HINARI set increased each year?	N	Y
Q2: Has the frequency of citations to the AGORA set increased each year?	N	Y
Q3: Has the frequency of citations to the Control set increased each year?	N	N
Q4: Has the percent change in frequency of citations to the HINARI set increased each year?	N	N

Table 4.20 - Continued

	Eastern Europe	Southern Europe
Q5: Has the percent change in frequency of citations to the AGORA set increased each year?	N	N
Q6: Has the percent change in frequency of citations to the Control set increased each year?	N	N
Q7: Is the average percent change in frequency of citations to the HINARI set from 2003-2007 greater than that from 2000-2002?	Y	Y
Q8: Is average percent change in frequency of citations to the HINARI 2000-2007 greater than that of the Control set?	Y	Y
Q9: Is average percent change in frequency of citations to the AGORA set from 2004-2007 greater than that from 2000-2003?	N	Y
Q10: Is average percent change in citations to the AGORA 2000-2007 greater than that to the Control set?	Y	Y
Q11: Is there regional variation with respect to the frequency of and percent change in frequency of citations to the HINARI set?	Y	Y
Q12: Is there regional variation with respect to the frequency of and percent change in frequency of citations to the AGORA set?	Y	Y

4.6 Oceana

4.6.1 Data Representations for Oceana

The following are the results for Q1 through Q10 for researchers in eligible Oceanic countries, presented both graphically and textually.

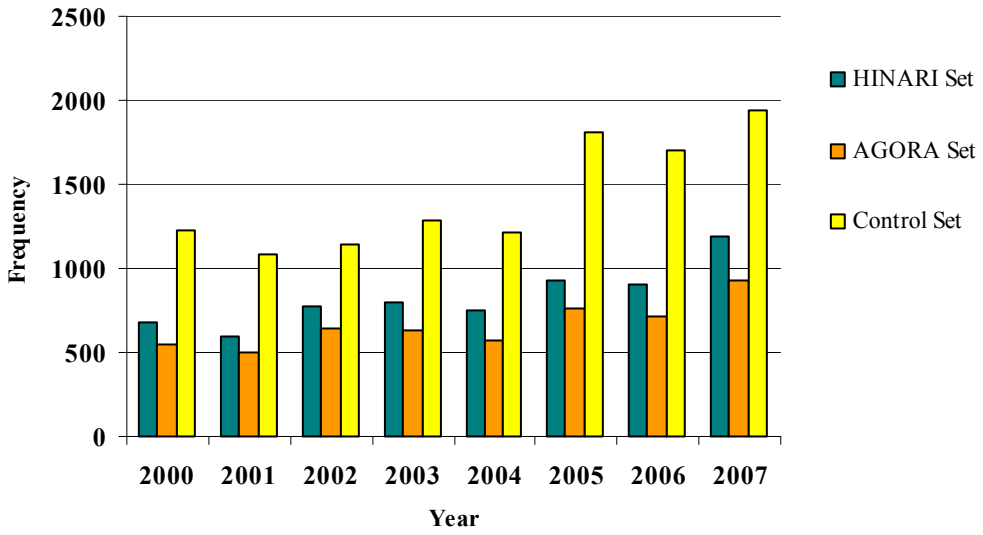


Figure 4.31 Frequency of Citations Made by Eligible Oceanic Researchers

As presented in Figure 4.31, the frequency of citations made by eligible Oceanic researchers to journals contained in the HINARI, AGORA and Control sets did not increase each year from 2000-2007.

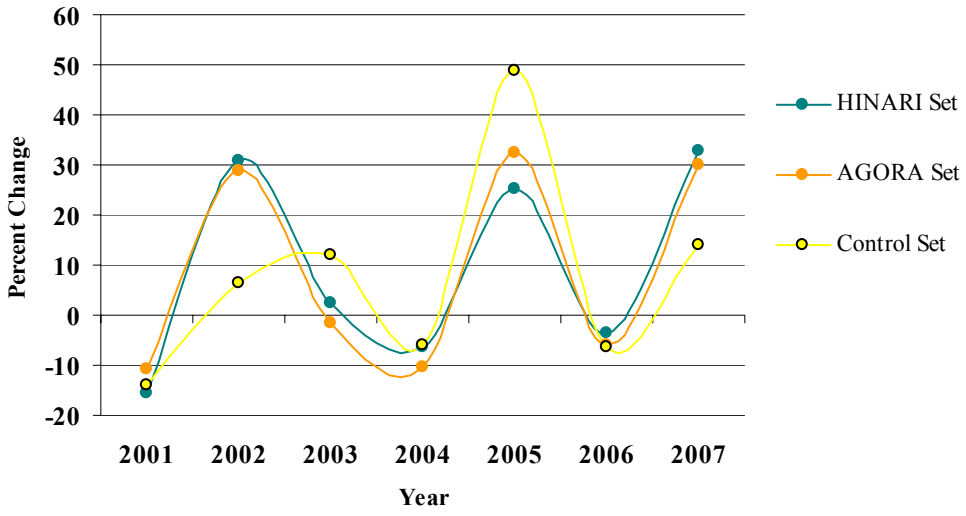


Figure 4.32 Percent Change in Frequency of Citations Made by Eligible Oceanic Researchers

As presented in Figure 4.32, the percent change in citations made by eligible Oceanic researchers to journals contained in the HINARI, AGORA and Control sets did not increase each year from 2001-2007.

Table 4.21 Average Percent Change in Frequency of Citations Made by Eligible Oceanic Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
2.5031	1.5462	6.0381	1.0124

As revealed in Table 4.21, the average annual percent change in frequency of citations made by eligible Oceanic researchers to journals contained in the HINARI set from 2003-2007 is greater than that from 2001-2002. The average annual percent change in frequency of citations made by eligible Oceanic researchers to journals contained in the HINARI set from 2001-2007 is greater than that to journals contained in the Control set.

Table 4.21 also reveals the average annual percent change in frequency of citations made by eligible Oceanic researchers to journals contained in the AGORA set from 2004-2007 is greater than that from 2001-2003. The average percent change in frequency

of citations made by eligible Oceanic researchers to journals contained in the AGORA set from 2001-2007 is greater than that to journals contained in the Control set.

4.6.2 Oceanic Sub-regional Comparisons

The following are the results for Q11 and Q12 for researchers in eligible Oceanic countries, presented both graphically and textually.

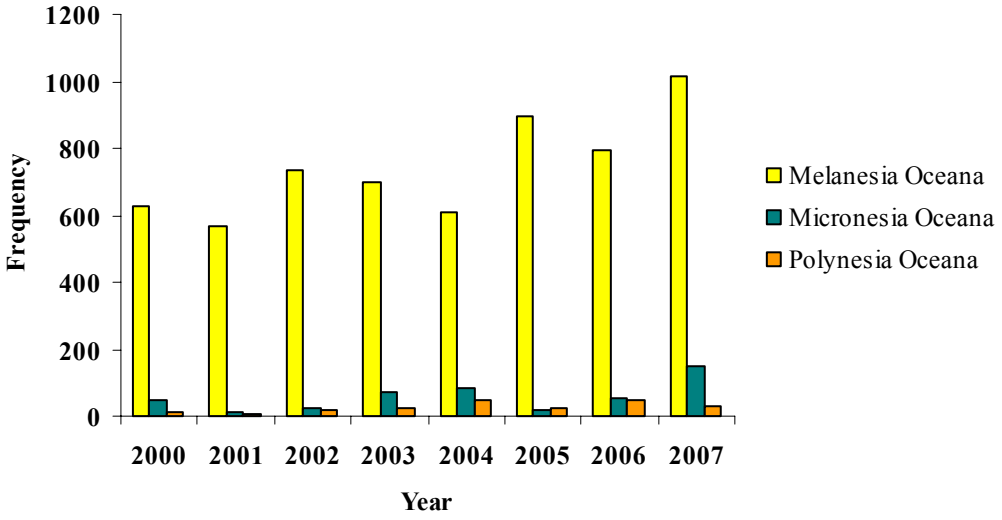


Figure 4.33 Frequency of Citations to HINARI Made by Eligible Oceanic Researchers

Figure 4.33 shows sub-regional variation with respect to the frequency of citations per year to articles published in journals contained in the HINARI set.

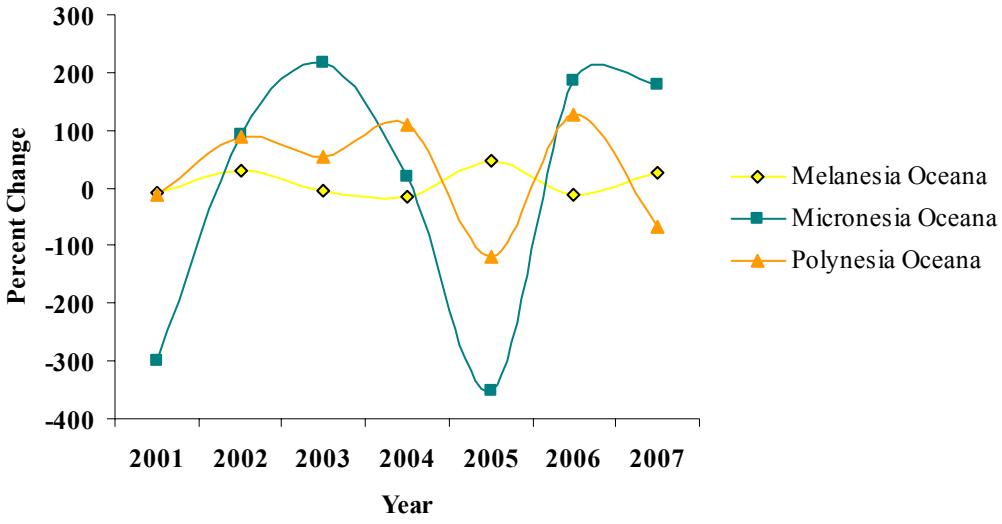


Figure 4.34 Percent Change in Citations to HINARI Made by Eligible Oceanic Researchers

Figure 4.34 reveals sub-regional variation with respect to percent change in frequency of citations per year to articles published in journals contained in the HINARI set.

Table 4.22 Average Percent Change in Citations to HINARI Made by Eligible Oceanic Researchers

	HINARI Average 2001-2002	HINARI Average 2003-2007	HINARI Change Before-After	HINARI Average 2001-2007	Control Average 2001-2007	HINARI-Control Difference
Melanesia Oceana	9.5614	8.3967	-1.1647	8.7295	8.1297	0.5998
Micronesia Oceana	-104.166	49.2816	153.4483	5.4393	-2.4184	7.8577
Polynesia Oceana	37.5000	20.8906	-16.6094	25.6362	36.6709	-11.0347

Table 4.22 describes sub-regional variation with respect to the average annual percent change in frequency of citations before and after the initiation of the HINARI program. Two sub-regions demonstrate negative change and one demonstrates positive change. For the entire period of the study, two sub-regions reveal a greater average annual percent change in frequency of citations to the HINARI set than to the Control set and one sub-region reveals a greater average annual percent change in frequency of citations to the Control set than to the HINARI set.

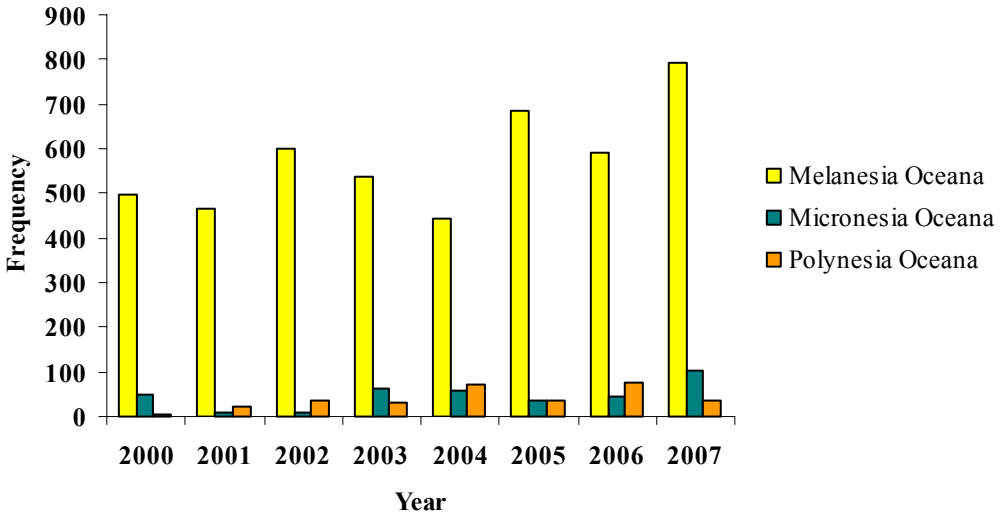


Figure 4.35 Frequency of Citations to AGORA Made by Eligible Oceanic Researchers

Figure 4.35 shows sub-regional variation with respect to the frequency of citations per year to journals contained in the AGORA set.

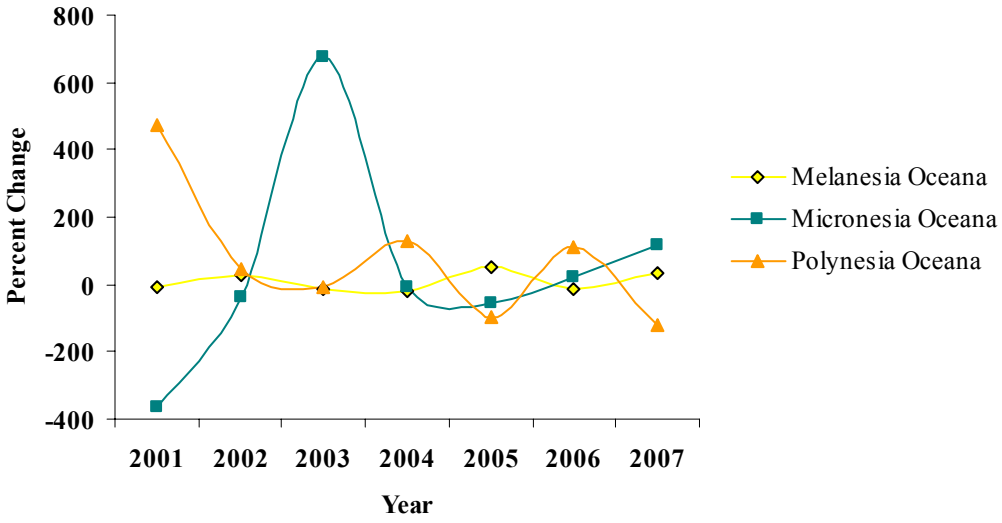


Figure 4.36 Percent Change in Citations to AGORA Made by Eligible Oceanic Researchers

Figure 4.36 reveals sub-regional variation with respect to the percent change in citations per year to journals contained in the AGORA set.

Table 4.23 Average Percent Change in Citations to AGORA Made by Eligible Oceanic Researchers

	AGORA Average 2001-2003	AGORA Average 2004-2007	AGORA Change Before-After	AGORA Average 2001-2007	Control Average 2001-2007	AGORA-Control Difference
Melanesia Oceana	3.5421	12.7924	9.2503	8.8280	15.3319	-6.5039
Micronesia Oceana	91.2879	20.0591	-71.2288	50.5857	19.0196	31.5661
Polynesia Oceana	171.0496	4.7768	-166.272	76.0365	11.8930	64.1436

Table 4.23 demonstrates sub-regional variation with respect to the average percent change in frequency of citations before and after the initiation of the AGORA program, with two sub-regions demonstrating negative change and one sub-region demonstrating positive change. For the entire period of the study, two sub-regions reveal a greater average annual percent change in frequency of citations to the AGORA set than to the Control set and one sub-region reveals a greater average annual percent change in frequency of citations to the Control set than to the AGORA set.

4.6.3 Results Summary for Oceanic Sub-regions

Table 4.24 summarizes the Oceanic sub-regional results for the twelve questions used to guide data treatment.

Table 4.24 Results Summary for Eligible Oceanic Researchers

	Melanesia	Micronesia	Polynesia
Q1: Has the frequency of citations to the HINARI set increased each year?	N	N	N
Q2: Has the frequency of citations to the AGORA set increased each year?	N	N	N
Q3: Has the frequency of citations to the Control set increased each year?	N	N	N

Table 4.24 - Continued

	Melanesia	Micronesia	Polynesia
Q4: Has the percent change in frequency of citations to the HINARI set increased each year?	N	N	N
Q5: Has the percent change in frequency of citations to the AGORA set increased each year?	N	N	N
Q6: Has the percent change in frequency of citations to the Control set increased each year?	N	N	N
Q7: Is the average percent change in frequency of citations to the HINARI set from 2003-2007 greater than that from 2000-2002?	N	Y	N
Q8: Is average percent change in frequency of citations to the HINARI 2000-2007 greater than that of the Control set?	Y	Y	N
Q9: Is average percent change in frequency of citations to the AGORA set from 2004-2007 greater than that from 2000-2003?	Y	N	N
Q10: Is average percent change in citations to the AGORA 2000-2007 greater than that to the Control set?	N	Y	Y
Q11: Is there regional variation with respect to the frequency of and percent change in frequency of citations to the HINARI set?	Y	Y	Y
Q12: Is there regional variation with respect to the frequency of and percent change in frequency of citations to the AGORA set?	Y	Y	Y

CHAPTER 5. INTERPRETATION OF REGIONAL RESULTS

5.1 Introduction

The results reported in Chapter Four are interpreted here. The significance of the results related to Questions 1-6 are discussed first. Questions 7-10 are then considered along with the potential influence of the HINARI and AGORA programs on the results. These relationships are explored at the regional and sub-regional levels; variation of the data among sub-regions within regions is also discussed. Finally, the results are considered in the wider context of scholarly communication and the information society.

5.2 Frequency of Citations

The HINARI and AGORA programs attempt to improve access to scholarly information by providing free access to academic journals through the internet to researchers in the least-developed countries. An expectation is that researchers will make greater scholarly use of the proffered journals. This scholarly use can be measured by the number of citations being made to the journals by those researchers. The initial step in the data treatment considered the frequency of citations made by eligible researchers each year over an eight-year period. Questions 1, 2 and 3 were put forth to explore whether researchers from eligible countries had been citing journals in the HINARI, AGORA, and Control sets with greater frequency each year.

As a whole, researchers from all eligible countries did not follow this pattern. Citations steadily increased to journals in the HINARI set every year, however they did not for the AGORA and Control sets. While most years did reveal an increase to all three sets; the AGORA and Control sets experienced a slight decline in 2004. If the data were presented as a smoothed line however, the decline in 2004 would be imperceptible, revealing an overall positive trend. On average, researchers from all eligible countries have been citing, and therefore, using journals in each set more often.

When analyzed at the regional level, interestingly, none of the regional data sets gave the same results as the World aggregate. The HINARI set was cited more frequently each year by Africa and Asia only; the AGORA set was cited more frequently each year by Asia and Europe only; and the Control set was cited more frequently each year by

Africa and Asia only. America, with a general decrease in citations during 2002 and 2004 and Oceana, with a general decrease in 2001 and 2004 presented clearly negative results for Q1, Q2, and Q3; while Asia presented positive results for Q1, Q2, and Q3. These distinctions speak strongly to the questions regarding regional variation and will be considered further below.

Q4, Q5 and Q6 explored whether citations were being made to the journal sets with a greater change in frequency each year by researchers from eligible countries. These questions build upon the previously three. For instance, a region must demonstrate a positive result for Q1, demonstrating an annual increase in frequency to the HINARI set, if it is to be possible for it to achieve a positive result for Q4, demonstrating an annual increase in the change of frequency. As the complete aggregate of data for the World gave positive results for Q1, it may have also showed positive results for Q4; however, it did not. While Africa, Asia and Europe all had the potential to support one or more of Q4, Q5 or Q6, none did. All eligible researchers, as well as some discrete regions and sub-regions may be citing this scholarly information more often; however, they are not doing so at an ever greater annual change in frequency. None of the data sets supported these three questions. Nevertheless, calculating the annual percent change was essential to producing relative values, which could then be compared in Questions 7 through 10.

5.3 Potential Influence of HINARI and AGORA

Questions 7 through 10 were designed to facilitate interpretation regarding the impact of the HINARI and AGORA programs on the scholarly communication of researchers in eligible countries. Q7 and Q9 looked to the average annual percent change in frequency of citations to the HINARI and AGORA journal sets, respectively, before and after the initiation of the programs. If the change was greater after the program's initiation, this suggested that the program was an influencing factor. It is recognized that other factors may have precipitated greater change, such as an increased infrastructure investment or an economic boom. If there was no change or it is less since the program's initiation, this suggested that the program was not an influencing factor on the scholarship of those researchers. It was recognized that other factors may have precipitated this lesser change, such as failing infrastructure or economic recession, thereby masking the programs'

impact. The impact of these other factors however, would be apparent in the annual percent change in the frequency of citations to the Control set as well.

As the Control set was comprised of all scientific and social-scientific journals available through the SCI and SSCI, excepting those offered through HINARI and AGORA, it represented the most influential scholarship in a broad array of disciplines, outside of the life sciences and agriculture. Q8 and Q10 looked to the annual percent change in frequency of citations to the HINARI and AGORA journal sets, respectively, as compared to that of the Control set. If the annual percent change in citation frequency differed from that of the Control set, this suggested that the factors precipitating change in frequency of citations were not common to researchers across all scientific and social-scientific disciplines. If the average annual percent change in the frequency of citations was higher than that to the Control set, this added weight to the possibility that the program positively impacted the scholarly communication of its eligible researchers. If it was similar to the average annual percent change in frequency of citations to the Control set, this suggested that factors influencing scholarship are common to researchers across all scientific and social scientific disciplines.

These were the strategies used to explore Questions 7-10. However, an additional examination was appropriate in some cases, specifically when Q7 was positive and Q8 was not, or if Q9 was positive and Q10 was not. As Q8 and Q10 considered an average over an 8-year period, detail was lost concerning the positive and negative fluctuations in the annual percent change. If annual percent change for the citations to the HINARI or AGORA journal sets rose and fell consistently with that of the Control set, this reinforced the negative result for Q8 or Q10. However, if the rise and fall of the fluctuation varied among the sets, closer inspection was warranted. A positive spike in the graph for any one year after a program's initiation where there is no corresponding spike for the Control set, suggested a positive impact specific to researchers using those journals during that year. The flow chart presented in Appendix D shows the steps followed during the process of interpretation.

With respect to the annual percent change in frequency of citations to the HINARI set, the data for all eligible researchers demonstrated an average annual change after the program's initiation was greater than before the program's initiation. The factors

influencing this outcome may or may not have been specific to life science researchers. Further analysis revealed that the Control set had a greater average annual change in citation frequency than did the HINARI set. This suggested that relative to other researchers life science researchers did not become increasingly more engaged in the formal scholarly communication process over the period of the study. Overall, the annual percent change in citation frequency to all sets rose and fell together with little variation. Factors precipitating these changes appeared to affect all scholarship.

The data for each region were positive for Q7, demonstrating a positive average annual increase after the HINARI program initiation. Interestingly, however, while the data for all eligible researchers was negative for Q8, every region analyzed discretely, gave positive results for Q8. Each region revealed a greater average annual percent change in frequency of citations to the HINARI set than to the Control set, suggesting that relative to other researchers, life science researchers became more engaged in the formal scholarly communication process over the period of the study. At the regional level of analysis, it seemed that the HINARI program positively affected scholarship in all regions. However, when the annual graphical data were considered, the results for America and Europe did not suggest that life sciences researchers became more engaged in scholarly communication since HINARI initiation.

With respect to the annual percent change in frequency of citations to the AGORA set, the data for all eligible researchers demonstrated a greater average annual percent change after the program's initiation. The factors influencing this outcome may or may not have been specific to life science researchers. Further analysis revealed that the Control set experienced a greater average annual increase in citation frequency over the period of the study than did the AGORA set. This data suggested that, for all regions combined, relative to other researchers agricultural researchers did not become more engaged in the formal scholarly communication process over the period of the study. Overall, the annual percent change in citation frequency to all sets rose and fell together with little variation. Factors precipitating these changes appeared to affect all scholarship.

The results for each region varied and did not necessarily reflect the results for all eligible researchers. Africa, Europe and Oceana demonstrated a greater average annual percent change after the AGORA program's initiation. America and Asia demonstrated a

lower average annual percent change after the program's initiation. The factors influencing these outcomes may or may not have been specific to agricultural researchers. Further analysis revealed that in each region, there was a higher average annual percent change in citations to the AGORA set than to the Control set. This suggested that, for each discrete region, relative to other researchers, agricultural researchers became more engaged in the formal scholarly communication process over the period of the study. These findings suggested that the AGORA program positively affected scholarship in all regions. However, closer inspection of the annual graphical data for America and Oceana did not suggest that agricultural researchers became more engaged in scholarly communication since the AGORA initiation.

A potential explanation for a greater change prior to AGORA's initiation, as demonstrated by America and Asia above, is that agricultural researchers may have been exposed to the HINARI collection when it was introduced in 2001. The HINARI and AGORA journal sets share journal titles, as they are supported by the same publishers. While there are unique titles in each journal set, there is considerable overlap between the collections. Another explanation for greater change prior to the AGORA program initiation could be the use of TEEAL, a CD-ROM product containing the full-text of a small set of agricultural journals. These titles also overlap with those in the AGORA collection. While this product had been available for several years prior to the AGORA offering, technology and capacity may have come together between 2000 and 2003, enabling researchers to make more productive use of the resource (Ochs, 2005).

5.4 Variation within Regions

At the regional level, the data suggest that both the HINARI and the AGORA programs are positively impacting the scholarship of life science and agriculture researchers from eligible countries. When regional data sets are disaggregated into sub-regional sets, however, there is variation within the regions; some sub-regions reveal results starkly different from those for the region of which it is a part. While gross description at the world and regional level is useful for understanding general trends, results at the level of sub-region provide a more targeted analysis. The sub-regional analyses that follow progress in the same manner as did the regional data.

5.4.1 Africa

Four of the five sub-regions within Africa demonstrated both positive average percent change in the frequency of citations to the HINARI set after the initiation of the HINARI program and an average change greater than that of the Control set. These findings suggested that the HINARI program positively affected scholarship in the Eastern, Middle, Northern and Western sub-regions of Africa. Researchers in Southern Africa did not demonstrate positive results, showing that the average annual percent change is less after the initiation of the program, and showing that the average annual percent change was less than the Control set over the period of the study. The data for Southern Africa suggested that relative to other researchers life science researchers did not become increasingly more engaged in the formal scholarly communication process over the period of the study.

The Eastern, Northern, and Southern African sub-regions demonstrated a greater average annual percent change after the AGORA program's initiation suggesting that the program positively affected scholarship among agricultural researchers there. The Middle and Western sub-regions demonstrated a lesser average annual percent change after the program's initiation. While the average annual percent change in the frequency of citations to the AGORA set is greater after the initiation of the program for Southern African researchers, the average change in frequency of citations to the AGORA set was less than that to the Control set over the period of the study. Also, researchers in Middle Africa did not demonstrate positive results, showing an average annual change less than the Control set over the period of the study. Both instances suggested that relative to other researchers agricultural researchers did not become increasingly more engaged in the formal scholarly communication process over the period of the study. Furthermore, inspection of the annual graphical data for these results suggested that despite Western Africa's greater citation frequency after program initiation, agricultural researchers there did not become more engaged in scholarly communication relative to all other researchers.

5.4.2 America

The Caribbean and Central American regions demonstrated positive average percent change in the frequency of citations to the HINARI set after the initiation of the HINARI program. South America, however, demonstrated a lesser average annual change after the program's initiation. The Caribbean and South America demonstrated an average percent change in the frequency of citations greater than that to the Control set, while Central America revealed an average percent change in frequency of citations less than that to the Control Set. These findings suggested that the HINARI program positively affected scholarship in the Caribbean. Researchers in South and Central America did not demonstrate these same positive results. After reviewing the annual data, results for both sub-regions suggested that the HINARI program positively affected scholarship and that relative to other researchers life science researchers became more engaged in the formal scholarly communication process over the period of the study.

The Central American sub-region demonstrated a higher average annual percent change after the AGORA program's initiation. The Caribbean and South American sub-regions demonstrated a lower average annual percent change after the program's initiation. However, the Caribbean and South America demonstrated an average change in frequency of citations to the AGORA set higher than that to the Control set, suggesting that the AGORA program is positively affecting scholarship there. While the average annual percent change in the frequency of citations to the AGORA program was greater after the initiation of the program for Central American researchers, the average change in frequency of citations to the AGORA set was less than that to the Control set. This finding suggested that relative to other researchers agricultural researchers from Central America were not increasingly more engaged in the formal scholarly communication process over the period of the study. However, inspection of the annual data suggested that Central America was positively impacted by the program, whereas the Caribbean and South America were not.

5.4.3 Asia

Four of the five sub-regions within Asia, Central, Eastern, South-eastern, and Western, demonstrated positive average percent change in the frequency of citations to

the HINARI set after the initiation of the HINARI program. Southern Asia however, demonstrated a lesser average annual percent change after the program's initiation. Looking to the annual graphical data, Southern Asia demonstrated greater scholarly engagement after the HINARI initiation. All sub-regions demonstrated an average percent change in the frequency of citations greater than that to the Control set. These findings suggested that the HINARI program is positively affecting scholarship in all sub-regions in Asia and that life science researchers were increasingly more engaged in the formal scholarly communication process over the period of the study.

The only Asian sub-region to demonstrate a higher average annual percent change after the AGORA program's initiation was South Asia. The remaining sub-regions demonstrated a lower average annual percent change after the program's initiation. These data suggested that the AGORA program did not affect scholarship in Central, Eastern, South-eastern, and Western Asia. However, all sub-regions revealed average change in frequency of citations to the AGORA set greater than that to the Control set. These findings suggested that factors precipitating these changes did not to affect all scholarship and that relative to other researchers agricultural researchers from each of the Asian sub-regions were increasingly more engaged in the formal scholarly communication process over the period of the study. Further, inspection of the annual graphical data also suggested that agricultural researchers in each of the Asian sub-regions were increasingly more engaged in the formal scholarly communication process over the period of the study.

5.4.4 Europe

Both Eastern and Southern Europe demonstrated positive average percent change in the frequency of citations to the HINARI set after the initiation of the HINARI program. Both sub-regions also demonstrated an average annual percent change greater than that of the Control set over the period of the study. These findings suggested that the HINARI program positively affected scholarship in these sub-regions of Europe and that relative to other researchers life science researchers were increasingly more engaged in the formal scholarly communication process over the period of the study.

The Southern European sub-region demonstrated a higher average annual percent change after the AGORA program's initiation suggesting that the program was positively affecting scholarship there. The Eastern European sub-region demonstrated a lower average annual percent change after the program's initiation. Inspection of the annual graphical data suggested that Eastern Europe did benefit from the AGORA program. Both sub-regions revealed average change in frequency of citations to the AGORA set greater than that to the Control set. These findings suggested that factors precipitating these changes did not to affect all scholarship and that relative to other researchers agricultural researchers from each of the European sub-regions were increasingly more engaged in the formal scholarly communication process over the period of the study.

5.4.5 Oceana

The Micronesia sub-region within Oceana demonstrated a greater average percent change in the frequency of citations to the HINARI set after the initiation of the HINARI program. These findings suggested that the program may be positively affecting scholarship in Micronesia. Researchers in Melanesia and Polynesia, however, demonstrated a lesser average percent change in frequency of citations after the initiation of the program. The Melanesian and Micronesian sub-regions revealed a greater average annual percent change in frequency of citations to the HINARI set than that to the Control set over the period of the study. These data suggested that relative to other researchers life science researchers in these sub-regions were increasingly more engaged in the formal scholarly communication process over the period of the study. However, the Polynesian sub-region revealed a greater average annual percent change in frequency citations to the Control set than that to the HINARI set. The data for Polynesia suggested that relative to other researchers life science researchers were not increasingly more engaged in the formal scholarly communication process over the period of the study. The annual graphical data further suggested that life science researchers in Melanesia were not more engaged in scholarly communication as a result of the HINARI program.

Melanesia demonstrated a positive average percent change in the frequency of citations to the AGORA set after the initiation of the AGORA program, suggesting that the program was positively affecting scholarship in Melanesia. Researchers in

Micronesia and Polynesia, however, did not demonstrate these same positive results, with a lesser average annual percent change after the initiation of the program. The Micronesian and Polynesian sub-regions revealed a greater average annual percent change in frequency of citations to the AGORA set than that to the Control set over the period of the study. These data suggested that relative to other researchers agricultural researchers in these sub-regions were increasingly more engaged in the formal scholarly communication process over the period of the study. However, the Melanesian sub-region showed the Control set with a greater average annual percent change than the AGORA set. The data for Melanesia suggested that relative to other researchers agricultural researchers have not been becoming increasingly more engaged in the formal scholarly communication process over the period of the study. According to the annual graphical data, none of the sub-regions were more engaged in the scholarly communication process as a result of the AGORA program.

5.5 Regional Results in Context

Horton (2000) wrote about scholarly communication as a critical force for international development. He made the point that while content provision efforts to this end are worthwhile, they cannot be separated from a country's capacity for research and publication. He identified several barriers to information flow. Early technological barriers included small and poorly resourced libraries, unreliable postal service, and limited ICT. Cultural barriers included research ethics, lack of peer-group interaction, lack of investigatory spirit, lack of methodological training, lack of emphasis on publication, and language. Further, the economics of journal publishing has restricted the availability of international research in the developing world.

The HINARI and AGORA programs exist in a complex global environment. As noted by Horton, there are many possible reasons why life science and agricultural researchers in some geographic regions seem to have responded to the programs and became more engaged in the scholarly communication process, while researchers in other regions have not. It is often asserted that lack of scholarly engagement is due to a general lack of research being conducted; however, Britz and Lor have demonstrated that this is usually not the case (Britz and Lor, 2003). It has also been suggested that lack

participation in the scholarly dialog has been a reflection of inadequate infrastructure (Cuervo, & Menéndez, 2005; Alemneh, & Hastings, 2005; Hilbert, & Katz, 2003); cultural barriers (Ofori-Adjei, et al., 2006); or poor information literacy (FAO, 2007; Chilimo, Emanuel, & Lwoga, 2005; Katikireddi, 2004).

While developing ICT infrastructure may not seem to be within the scope of the mission of the HINARI or AGORA programs, electronic content provision is a component of ICT infrastructure, as defined by the WSIS Plan of Action. The mere existence of the programs however, does not guarantee participation. Organizations within eligible countries must be made aware of the programs and how to register for them through program outreach. These organizations must also have the desire to implement and support the secure client-side interface at their physical locations. It is possible that local information providers and researchers may doubt that electronic content provision would improve their scholarly situation. Social scientists have noted the difficulties with overcoming the traditions of indigenous knowledge cultures that generations have depended upon for solving local problems (Xia, 2006; Meyer, & Boon, 2003; Steinwachs, 1999). Because of this cultural entrenchment, the superimposition of technologies often has not been successful.

Other scholars have asserted that the failure of some researchers to participate in global scholarly communication has been due to a lack of information literacy skills, which are particularly underdeveloped among people in agrarian cultures (Katikireddi, 2004). The lack of these skills is recognized as one of the major causes of underutilization of the existing ICTs in many libraries (Chilimo, Emanuel, & Lwoga, 2005). Even if organizations in the eligible countries have registered for and implemented HINARI and AGORA, it is possible that the journals will not be accessed because librarians and researchers do not understand how to use the technology. The HINARI and AGORA programs address these information literacy issues through training initiatives (Chisenga, Keizer, Rudgard, Onyancha, & Zwart, 2006).

Training has been streamlined as HIANRI and AGORA use the same authentication systems and a similar portal interface (Ochs, Aronson, & Wu, 2004). Users have been trained on how to log in with their assigned user name and password, navigate the portal, link to publishers' websites, conduct searches for articles and download articles. The

Information Training and Outreach Centre for Africa (ITOCA) was initiated in 1999 as a capacity building organization designed to improve ICT skills for African librarians, information specialists, scientists, researchers and students. ITOCA initially trained on the TEEAL Collection, but has been mandated to carry out training and outreach for HINARI and AGORA as well (ITOCA, 2008).

While the provision of online scholarly content is the core of the HINARI and AGORA programs, outreach and capacity building through training are essential for program success. Since resources are limited for these activities, effort should be made to appropriate them efficiently. The data presented in this study may be used to 1) identify which geographic areas are demonstrating greater engagement in scholarly communication and ground further research in order to better understand their success and 2) identify which geographic areas are not demonstrating greater engagement in scholarly communication and ground further research so to better understand their lack of success. If combined with their own proprietary data, the results of this study should support program assessment and planning efforts.

In the interpretation of results, the data demonstrated that for many regions, life science and agriculture researcher are becoming more engaged in scholarly communication as a result of the programs. However, within each region at the sub-regional level, this was not always the case. Asian sub-regions demonstrate the greatest consistency in results. Most regions reveal variable results for their sub-regions. This interpretation presents an adequate overview of the patterns of scholarly communication for these researchers. However, the Country-level data, found in Appendix C would provide the most targeted and nuanced information, and should be considered the appropriate level of analysis for HINARI and AGORA program planners.

CHAPTER 6. CONCLUSIONS

6.1 Reflections on Theory and Method

While statistics may show an increase on any given economic or social measure for any given geographic area, within that area there is often polarization. According to Castells (2000b, p. 162), this occurs due to resources being appropriated to some areas (or groups) more than others, resulting in those areas (or groups) having greater increases on that measure, while resources are being withheld from other areas (or groups) resulting in those areas (or groups) having a relative decrease on that measure. So, while the geographic area on the whole appears to be improving, in fact, subsections of that area may be experiencing significant declines in economic and social well-being. It is essential to disaggregate and reanalyze data to determine if this pattern exists.

There are two points in Castells' proposition that apply to this study. Firstly, aggregated social statistics may be deceiving. Polarization, as a result of social exclusion, produces extreme positive and extreme negative data. When aggregated, these extreme data may be neutralized. It may even result in a positive finding for the whole; while in fact, parts of that whole may demonstrate extreme negative findings. While citation data are not traditional economic or social indicators, citations, as an indicator of scholarly activity, are impacted by the same forces that create change in the economy and the society. If the polarization is evident in economic and social statistics, it may also be evident in citation statistics. This phenomenon seems to be present in this study as aggregated regional data did not always reflect the realities of the disaggregated extremes in the sub-regional data. Africa, for instance demonstrated generally positive findings for the region, whereas all of the African sub-regions did not. While Northern, Western and Eastern Africa demonstrated positive results, Middle and Southern Africa did not. This detail is lost in the aggregated regional data.

The second point in Castells' proposition is that resources are appropriated unevenly resulting in relative reduction in both ICT and capacity to use them effectively for those areas experiencing social exclusion. He claims that unless there is a change in the current structure of information capitalism through purposive human action to reduce and/or eliminate social exclusion, these areas will continue to degrade and provide no escape

from miserable physical conditions. The HINARI and AGORA programs are fine examples of this kind of purposive human action. Nevertheless, more targeted intervention is necessary by identifying geographic areas where eligible researchers in the life sciences and agriculture disciplines have and have not been demonstrating a greater engagement in the scholarly communications process. Those researchers that have not may be experiencing some form of social exclusion, the solution to which may or may not be within the purview of the HINARI or AGORA programs. Nevertheless, further research can identify their barriers to success. This knowledge may then be applied to outreach and capacity building efforts.

6.2 Significance of Results

If the developing world is to have a real opportunity to become equal partners in the global political economy, they must be able to negotiate the emerging information society. Programs such as HINARI and AGORA advance formal scholarly communication as a means of reducing the North-South divide. It is essential that the WHO and FAO continue to take advantage of their collaboration with participating publishers to its fullest extent. The WHO and FOA have until 2015 to build capacity in the least developed countries through outreach and training. However, there has been little understanding of the patterns of journal use in these countries to help focus their efforts. A comprehensive base of data is provided by this study that will facilitate an assessment of the programs in various regional and sub-regional contexts. A comprehensive picture of scholarly journal use will aid in the identification of geographic regions failing to fully engage in formal scholarly activity despite the availability of journals through the programs.

This study provides a comprehensive survey of the scholarly use of journals offered through the HINARI and AGORA programs as suggested by the journal-citing patterns of researchers in the least-developed countries. Data representations sufficient for testing the twelve questions are provided for each country, each sub-region and each region in Appendix C. Summary results for the all questions are also provided in Appendix C. Data is qualified in such a way as to facilitate further analysis by HINARI and AGORA program planners. By combining these study results with data from internal records and

research conducted by the programs themselves, useful information may be gleaned. For instance, the data may be analyzed with download statistics to determine the relationship between practical use and scholarly use. To help inform outreach and training initiatives, these study results may be matched to previous training and outreach records. Such analyses may highlight which efforts seem to be most successful in which geographic areas. These efforts might then be duplicated in geographic areas with similar academic cultures where the efforts would experience the highest likelihood of success. Academic culture however is a complex phenomenon to which this data does not directly speak. Qualitative research is ideally suited for comprehending complex cultural environments.

Finally, this study is significant in that while the method used centers on a familiar application of bibliometrics, the data collection, organization and treatment are unique and may be replicated to address similar research needs. This analysis can be executed for any defined user group in order to better understand their scholarly use of specific sets of journals. Publishers or aggregators of online scholarly content for example may wish to better understand the formal scholarly communication patterns of the researchers in subscribing organizations as they relate to their products or the products of their competitors. Libraries and other information providers have often used this bibliometric application for the purposes of collection development. This automated protocol enables a more efficient means of data processing and a more comprehensive analysis.

6.3 Future Research

Analysis of the sub-regional data presented in Appendix C will provide the most useful information with which HIANRI and AGORA program administrators might plan future action. It would be beneficial to consider this information with the added dimensions of institutional subscription, demographic and infrastructure data. The data from this study may also be compared to article download statistics to better understand the type of use being made of the AGORA journals. However, the most valuable knowledge for program planners will come through qualitative research. Interviews with stakeholders and participant observation of the academic cultures in areas demonstrating both success and lack of success would significantly inform future capacity-building efforts.

Social Science researchers may also be interested in using this data. Again, it may be usefully coupled with other statistics to identify patterns. The UN Statistics Division collects and compiles population and demographic statistics and provides several social indicators to shed light on quality of life in any given country. Potential future research may include correlating population statistics with results in this study. The number of articles published and the frequency of citations made in those articles reveals trends in research output and scholarly engagement. It may be found that like the research impact and recognition distributions of Katz' (2000) study, the research output and scholarly engagement of countries may also be distributed in a non-linear manner.

Another potential research tool is the Knowledge Economy Index, produced by the World Bank. It provides a comprehensive assessment of "a country's preparedness to compete in the knowledge economy using 83 structural and qualitative variables" (World Bank, 2008). The index combines data from four broad areas: economic and institutional regimes, education and information literacy, capacity for innovation, and ICTs. It uses both external sources of data and data internal to the World Bank. While seemingly ideal as data for correlation studies, unfortunately, only 61 of the least-developed countries are included in the database for the years covered by this study. And of these 61, "missing data" is indicated for 38. It is not clear which data is missing however, so even an analysis with one of the KEI areas is untenable. A snap shot of the KEI results for the year 2003 for the available countries eligible to participate in HIANRI and AGORA is presented in Appendix E.

A qualitative study to further an understanding of these research results is in the planning stage; it is tentatively called "Exploring the use of AGORA by eligible agricultural researchers." A series of in-depth semi-structures interviews will be conducted at an international agricultural information conference in August, 2008. The purpose of this research project is to better understand the use of the AGORA program by eligible agricultural researchers and agricultural information specialists. The results of this work will provide a knowledge base to inform program development and set a foundation for future research in this evolving area of scholarly communication. Of particular interest is the eventual development of a grounded theory about the cultures of scholarship.

APPENDIX A. ELIGIBLE COUNTRY INFORMATION

Table A.1 Eligible Country Information

Region	Sub-region	Country Name	Alternate Country Name	Previous Country Name	ISI Abbreviation
Africa	Eastern Africa	Burundi			
Africa	Eastern Africa	Comoros			
Africa	Eastern Africa	Djibouti			
Africa	Eastern Africa	Eritrea			
Africa	Eastern Africa	Ethiopia			
Africa	Eastern Africa	Kenya			
Africa	Eastern Africa	Madagascar		Malagasy	
Africa	Eastern Africa	Malawi			
Africa	Eastern Africa	Mozambique			
Africa	Eastern Africa	Rwanda			
Africa	Eastern Africa	Somalia			
Africa	Eastern Africa	Uganda			
Africa	Eastern	Tanzania	United		

Table A.1 - Continued

Region	Sub-region	Country Name	Alternate Country Name	Previous Country Name	ISI Abbreviation
	Africa		Republic of Tanzania		
Africa	Eastern Africa	Zambia			
Africa	Eastern Africa	Zimbabwe			
Africa	Middle Africa	Angola			
Africa	Middle Africa	Cameroon			
Africa	Middle Africa	Central African Republic			Cent Afr Rep
Africa	Middle Africa	Chad			
Africa	Middle Africa	Congo			
Africa	Middle Africa	DR Congo	Democratic Republic of the Congo	Zaire, The Belgian Congo	
Africa	Middle Africa	Equatorial Guinea			Equat Guinea
Africa	Middle Africa	Sao Tome and Principe			Sao Tome E Prin
Africa	Northern Africa	Algeria			
Africa	Northern	Morocco			

Table A.1 - Continued

Region	Sub-region	Country Name	Alternate Country Name	Previous Country Name	ISI Abbreviation
	Africa				
Africa	Northern Africa	Sudan			
Africa	Northern Africa	Tunisia			
Africa	Southern Africa	Lesotho			
Africa	Southern Africa	Namibia			
Africa	Southern Africa	Swaziland			
Africa	Western Africa	Benin			
Africa	Western Africa	Burkina Faso			
Africa	Western Africa	Cape Verde			
Africa	Western Africa	Cote Ivoire			
Africa	Western Africa	Gambia			
Africa	Western Africa	Ghana			
Africa	Western Africa	Guinea			
Africa	Western Africa	Guinea-Bissau			

Table A.1 - Continued

Region	Sub-region	Country Name	Alternate Country Name	Previous Country Name	ISI Abbreviation
Africa	Western Africa	Liberia			
Africa	Western Africa	Mali			
Africa	Western Africa	Mauritania			
Africa	Western Africa	Niger			
Africa	Western Africa	Nigeria			
Africa	Western Africa	Senegal			
Africa	Western Africa	Sierra Leone			
Africa	Western Africa	Togo			
America	Caribbean	Cuba			
America	Caribbean	Dominican Republic			Dominican Rep
America	Caribbean	Haiti			
America	Caribbean	Jamaica			
America	Central America	El Salvador			
America	Central America	Guatemala			
America	Central	Honduras			

Table A.1 - Continued

Region	Sub-region	Country Name	Alternate Country Name	Previous Country Name	ISI Abbreviation
	America				
America	Central America	Nicaragua			
America	South America	Bolivia			
America	South America	Ecuador			
America	South America	Guyana			
America	South America	Paraguay			
America	South America	Peru			
America	South America	Suriname			
Asia	Central Asia	Kazakhstan			
Asia	Central Asia	Kyrgyzstan			
Asia	Central Asia	Tajikiztan	Tajikistan		
Asia	Central Asia	Turkmenistan			
Asia	Central Asia	Uzbekistan			
Asia	Eastern Asia	Mongolia			Mongol Peo Rep
Asia	South-eastern Asia	Cambodia			

Table A.1 - Continued

Region	Sub-region	Country Name	Alternate Country Name	Previous Country Name	ISI Abbreviation
Asia	South-eastern Asia	Laos	Lao People's Democratic Republic		
Asia	South-eastern Asia	Myanmar		Burma	
Asia	South-eastern Asia	Timor-Leste			
Asia	South-eastern Asia	Viet Nam	Vietnam		
Asia	Southern Asia	Afghanistan			
Asia	Southern Asia	Bangladesh			
Asia	Southern Asia	Bhutan			
Asia	Southern Asia	Maldives			
Asia	Southern Asia	Nepal			
Asia	Western Asia	Armenia			
Asia	Western Asia	Azerbaijan			
Asia	Western Asia	Georgia			Rep of Georgia
Asia	Western Asia	Iraq			

Table A.1 - Continued

Region	Sub-region	Country Name	Alternate Country Name	Previous Country Name	ISI Abbreviation
Asia	Western Asia	Jordan			
Asia	Western Asia	Syria	Syrian Arab Republic		
Asia	Western Asia	West Bank	Occupied Palestinian Territory, Gaza		
Asia	Western Asia	Yemen			
Europe	Eastern Europe	Belarus			Byelarus
Europe	Eastern Europe	Bulgaria			
Europe	Eastern Europe	Moldova	Republic of Moldova		
Europe	Eastern Europe	Romania			
Europe	Eastern Europe	Ukraine			
Europe	Southern Europe	Albania			
Europe	Southern Europe	Bosnia Herzegovina	Bosnia & Herzegovina		Bosnia & Herceg
Europe	Southern Europe	Macedonia	The Former Yugoslav Republic of	Yugoslavia	

Table A.1 - Continued

Region	Sub-region	Country Name	Alternate Country Name	Previous Country Name	ISI Abbreviation
			Macedonia		
Europe	Southern Europe	Montenegro	Republic of Montenegro		
Europe	Southern Europe	Serbia	The Republic of Serbia		
Oceana	Melanesia	Fiji			
Oceana	Melanesia	Papua New Guinea			Papua N Guinea
Oceana	Melanesia	Solomon Islands			
Oceana	Melanesia	Vanuatu			
Oceana	Micronesia	Kiribati	Gilbert Islands		
Oceana	Micronesia	Marshall Islands			
Oceana	Micronesia	Micronesia	Federated States of Micronesia		
Oceana	Polynesia	Samoa	Samoa (Western)		
Oceana	Polynesia	Tokelau			
Oceana	Polynesia	Tonga			
Oceana	Polynesia	Tuvalu			

APPENDIX B. DATA COLLECTION AND PREPARATION

B.1 Introduction

The initial phase of this study required three distinct data sets containing information about countries, journal titles and citations. These data were ultimately stored in a Microsoft Access database named the LDC Citations database in tables called the Country Authority file, Title Authority file, and Citations Data file.

B.2 Country Authority

The data for the Country Authority table contains records for each of the least-developed countries as designated by the UN. This table included several fields, such as Country Name, Alternate Country Name, Previous Country Name, ISI Abbreviation, Sub-region, and Region. The primary designator was the Country Name as presented from the eligible countries lists on the HINARI and AGORA websites. These were not always the most common form of the country name however and so Alternate Country Name was added. Occasionally, when searching the SCI and SSCI, it became evident that the country had changed its official name in the recent past. In these cases, it was necessary to search multiple country names as either the name change took place during the period of the study, or the indexers at Thomson had not completely transitioned to the new name. Regional and sub-regional geographical groups were assigned to each country according to distinctions outlined by the UN Statistics Division (UN Department of Economic and Social Affairs, 2007).

B.3 Title Authority

Several early attempts were made to compile a comprehensive and detailed Title Authority for this study. Resources included Ulrich's International Periodical Directory, SCI title list, SSCI title list, Web of Science abbreviated title list, the AGORA website and the HINARI website. Ideally, all of these lists would have been matched, sorted and de-duplicated according to the ISSN, which is the standard unique identifier for a journal title. However, not all of the sources provided the ISSN in their title lists. While having a comprehensive title list would have been ideal for future research, it was not necessary for the effective completion of this study. Therefore, focus for building the Title

Authority turned to which fields were essential for the execution of the query to determine frequency of citations to certain journal sets. As the bibliographic data for the citations contain only an abbreviated title to represent the journal being cited, the match between the Citation Data Table and the Title Authority Table would have to happen on this field

The Thomson Web of Science Abbreviated Title list for the SCI and SSCI titles presents both the full title and the abbreviated title and was used to bridge the citation data (with abbreviated titles) and the title lists from the HINARI and AGORA websites (with full titles). To populate the Title Authority Table of the LDC Citations database, the three title lists were matched on their common field, the full title, and then de-duplicated on both the full title and the abbreviated title field. The fields resulting from this process were Title, Abbreviation, HINARI Inclusion and AGORA Inclusion. The Title Authority Table contains 1,274 journals assigned to the HINARI set, 685 journals assigned to the AGORA set, and 14,410 journals assigned to the Control set.

While the compilation of Title Authority Table required a great deal of trial and error, the procedures below outline the most efficient means of replicating it.

- Collect and organize title files
    - Copy and paste title lists from the sources (HINARI website, AGORA website and Abbreviated Title list from Thomson) into text files
    - Create a Microsoft Excel workbook called Title Authority
    - Create worksheets for each of the title lists
- Import collections title lists
    - Import the AGORA titles into the appropriate Title Authority Worksheet as a delimited file on the '(' character
    - Delete all columns except for the title column
    - Find 'period space', i.e. '. ', and replace with 'period'
    - Apply the Convert-text-to-columns function using the period as a delimiter
    - Delete column A
    - Import the HINARI titles into the appropriate Title Authority Worksheet as a delimited file on the '-'character

    - Delete all columns except for the title
    - Find all ‘numbers plus space’ (e.g. ‘1 ‘, ‘2 ‘) and Replace with nothing
    - Find all numbers and replace with nothing
    - Replace the ‘21’ in the first title -21st Century Society: Journal of the Academy of Social Sciences
    - Add a column of ‘1’s to each list to indicate inclusion
    - Add appropriate column headings.
- Import Web of Science Abbreviated Title list
    - Import the Abbreviated title list into the Excel Title Authority as a tab delimited file
    - Delete the first cell in column B and shift sells up so that the full and abbreviated titles align
    - Sort column A Ascending and delete empty rows
    - Filter out duplicate records on the Abbreviation field
    - Add appropriate column headings
- De-duplicate the HINARI and AGORA records
    - Import the HINARI and AGORA worksheets into the Access LDC Citations Database.
    - Run three queries that isolate the overlapped titles, HINARI only titles, and AGORA only titles (show the title and inclusion fields)
    - Export the results of these queries back to a single new Title Authority Worksheet labeled HINARIAGORA
    - Filter out the duplications on the Title field
- Building the Title Authority
    - Import the HINARIAGORA, and Abbreviated Titles worksheets into the Access LDC Citations Database as separate tables
    - Ensure the data type for the HINARI and AGORA fields are numbers rather than text
    - Establish the appropriate joins on the Abbreviated Titles field
    - Run and save the query as ‘Title Authority Builder for Export’

    - Export the results of the query back to the Title Authority Excel Workbook.
- Code for Control set
    - Open the Title Authority Builder for Export Worksheet in Excel
    - Sort by the AGORA column
    - Add 0s in cells that do not contain 1s
    - Sort by the HINARI column
    - Add 0s in cells that do not contain 1s
- Complete the Title Authority file
    - Import the Title Authority Builder Worksheet back into the Access LDC Citations Database
    - Name the table 'Title Authority'

B.4 Citations Data

The data for the Citations Data set comes from the Science Citation Index and the Social Science Citation Index. These indices are a part of a broader database environment called Web of Science produced by Thomson. The indices contain article-level records with citation information. Queries requested records of feature articles authored by researchers form a certain country during a specific period of time. Usually the time period was one year as the results set was more easily managed. In all, 864 queries were conducted. Results for each query were downloaded in batches of 500 records in a tab-delimited file formatted for Windows. These data files were then imported to Microsoft Excel Spreadsheets.

Each of the article-level records that were downloaded contained multiple fields such as author country, journal title, article title, pages numbers, and citations made within the article. The citations data was a contained in a field and could be further extracted. This new, extracted data set included the abbreviated journal title for the journal that was cited. Essential information was associated with the abbreviated journal title including the year that the citation was made and the country of origin of the author making the citation. These records were then imported into the LDC Citations database as the

Citations Data Table. The fields for this table include the Cited Author, the Cited Year, the Cited Journal (Abbreviation), Citing Year, and Citing Country.

In order to properly collect and prepare this data, the following procedures should be executed for each:

- Advanced Search in the Web of Science Database
    - Select SCI and SSCI
    - Limit by Year – 200X
    - Limit by Document Type – Article
    - Query 'cu=Country Name'
- Retrieve Data from Web of Science Database
    - Select result set
    - Select output option 'Full Record + Cited Refs'
    - Select output format 'Tab delimited for Windows'
    - Repeat for results with more than 500 records
- Store Data
    - Name text files by country initials and year
    - If more than 500 records, add part number – Example – N00(1), N00(2)
- Organize Workspace
    - Create an Excel workbook for each country
    - Create 8 worksheets for article-level records for each year
    - Create 8 worksheets for citation-level records for each year
    - Name worksheets by country initials, year and record level – Example – N00, N00CR
- Extract Citation Data
    - Import article-level records into the appropriate worksheets
    - Find the field label 'CR' within each worksheet
    - Highlight the entire column and copy
    - Paste special – Unformatted, Unicode – into a Microsoft Word document
- Reformat Citation Data
    - Find semicolon and space, replace with a line break - carat and bar as demonstrated in Figure 6

    - Find comma and space, replace with comma
    - Find asterisk, replace with nothing
    - Find ‘IN PRESS_’ , replace with nothing
    - Save as text file with a Unicode character set
- Prepare Citation Data
    - Import the comma-delimited file into the appropriate worksheet
    - Sort records by column A ascending, shift anonymous citations to the right
    - Sort records by column B descending, shift ‘no date’ items to the right
    - Delete columns C and D
    - Create and populate a columns for Year and Country

The data are now prepared for import into the Project Authority database containing the other data sets. The CR worksheets must be imported one at a time and appended to a single table. Due to row limitations in Excel, aggregation of data before importing to Access is untenable. Name the table Citations Data.

APPENDIX C. COMPLETE STUDY RESULTS

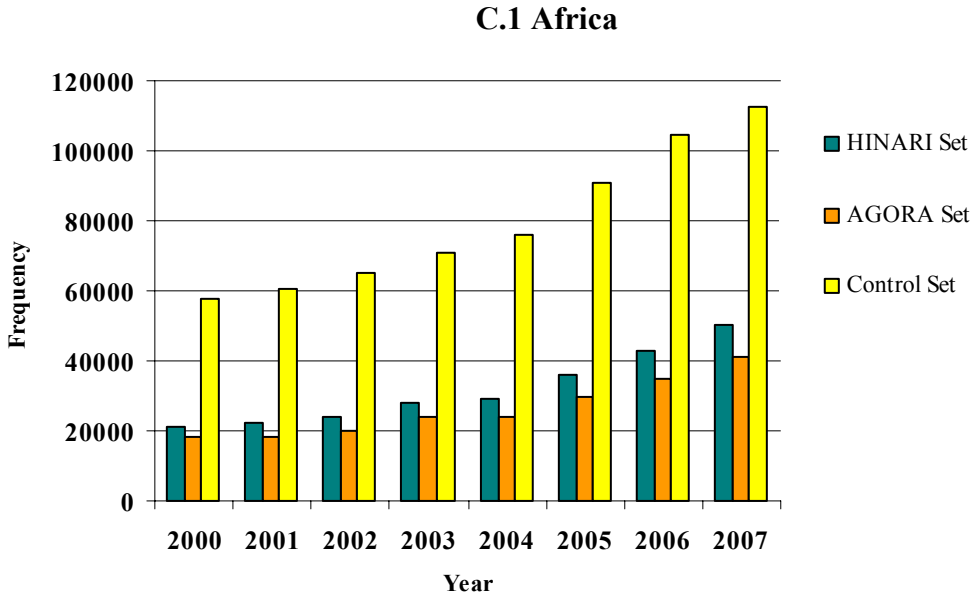


Figure C.1 Frequency of Citations Made by Eligible African Researchers

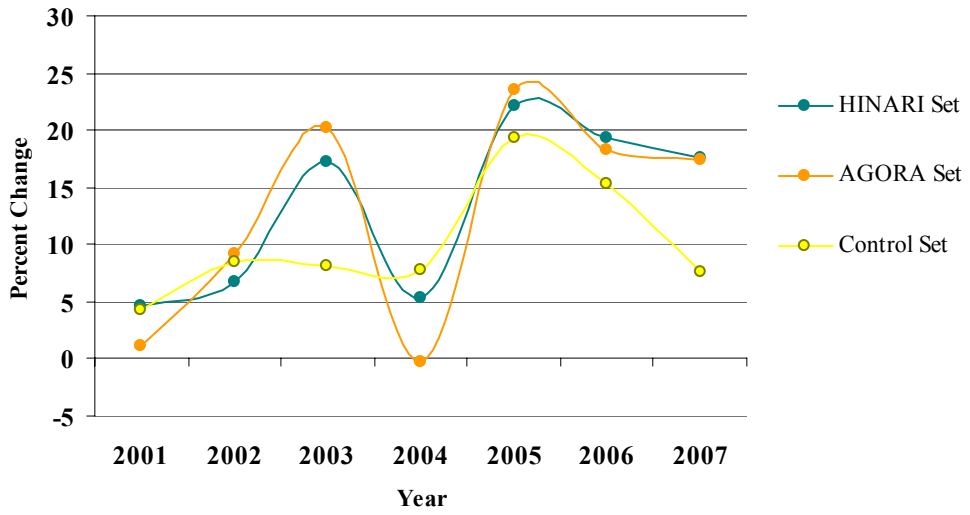


Figure C.2 Percent Change in Frequency of Citations Made by Eligible African Researchers

Table C.1 Average Percent Change in Frequency of Citations Made by Eligible African Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
10.6638	3.1784	4.6079	2.6539

C.1.1 Eastern Africa

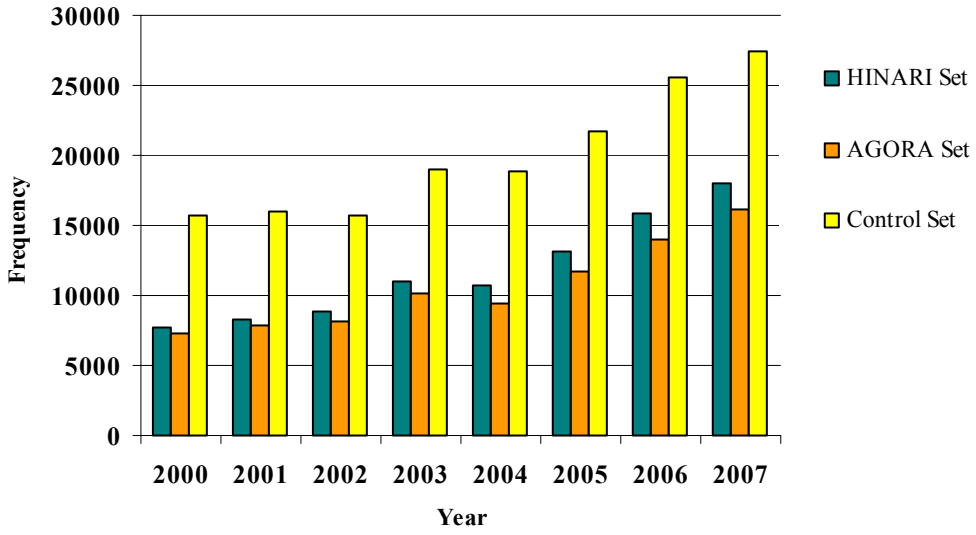


Figure C.3 Frequency of Citations Made by Eligible Eastern African Researchers

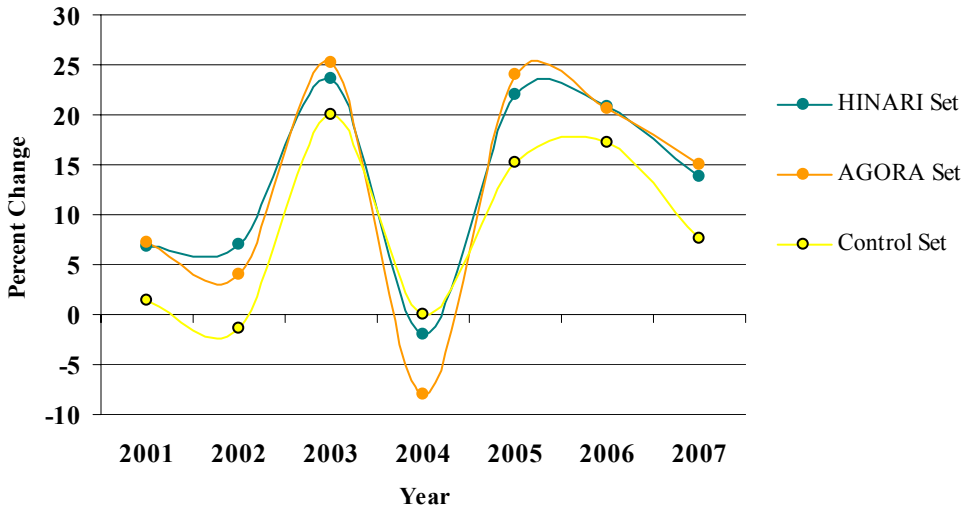


Figure C.4 Percent Change in Frequency of Citations Made by Eligible Eastern African Researchers

Table C.2 Average Percent Change in Frequency of Citations Made by Eligible Eastern African Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
8.7621	4.5439	0.7657	4.0112

C.1.1.1 Burundi

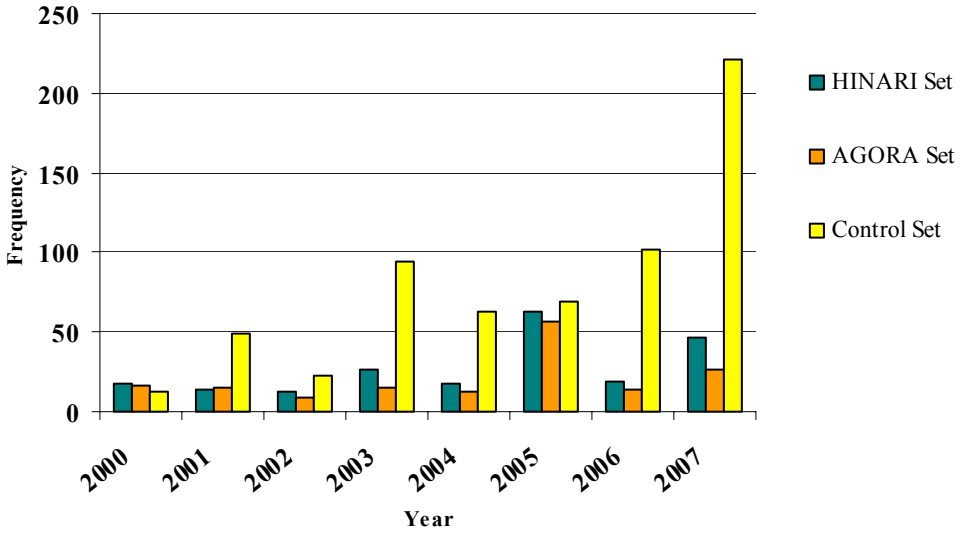


Figure C.5 Frequency of Citations Made by Burundi Researchers

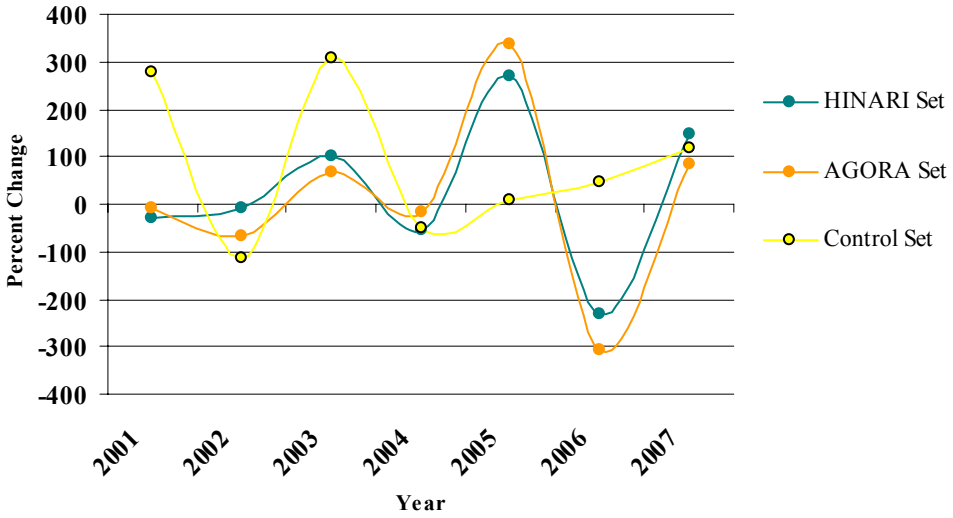


Figure C.6 Percent Change in Frequency of Citations Made by Burundi Researchers

Table C.3 Average Percent Change in Frequency of Citations Made by Burundi Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
64.8192	-57.1732	27.6343	-71.7720

C.1.1.2 Comoros

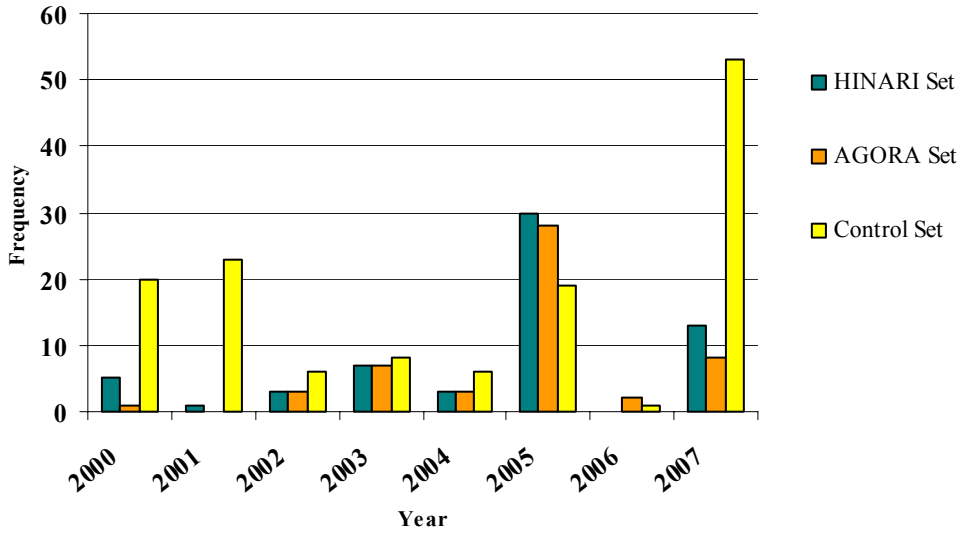


Figure C.7 Frequency of Citations Made by Comoros Researchers

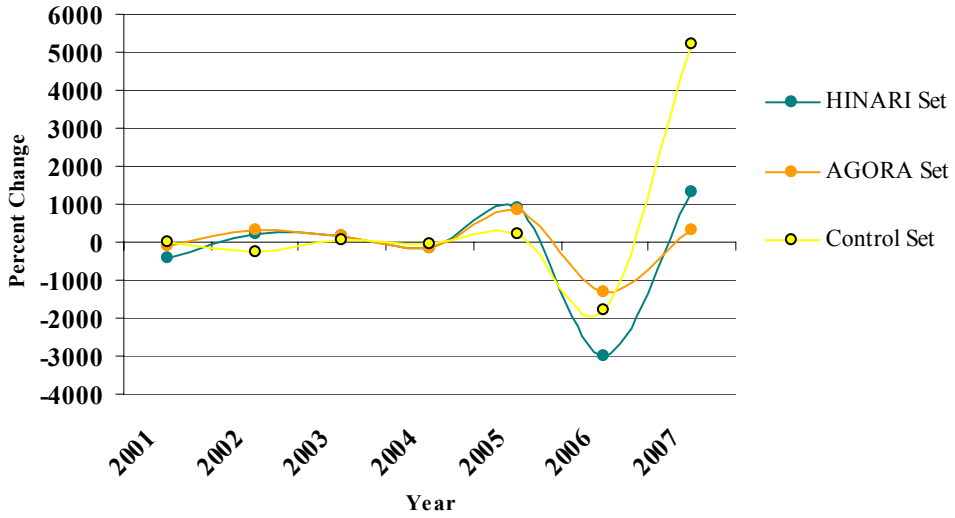


Figure C.8 Percent Change in Frequency of Citations Made by Comoros Researchers

Table C.4 Average Percent Change in Frequency of Citations Made by Comoros Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-60.0000	-621.1905	-186.1111	-473.5714

C.1.1.3 Djibouti

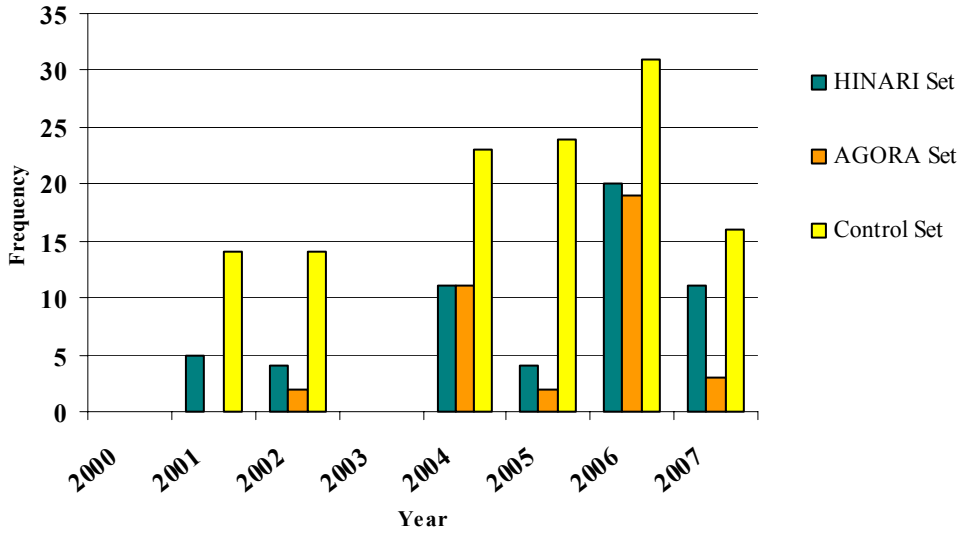


Figure C.9 Frequency of Citations Made by Djibouti Researchers

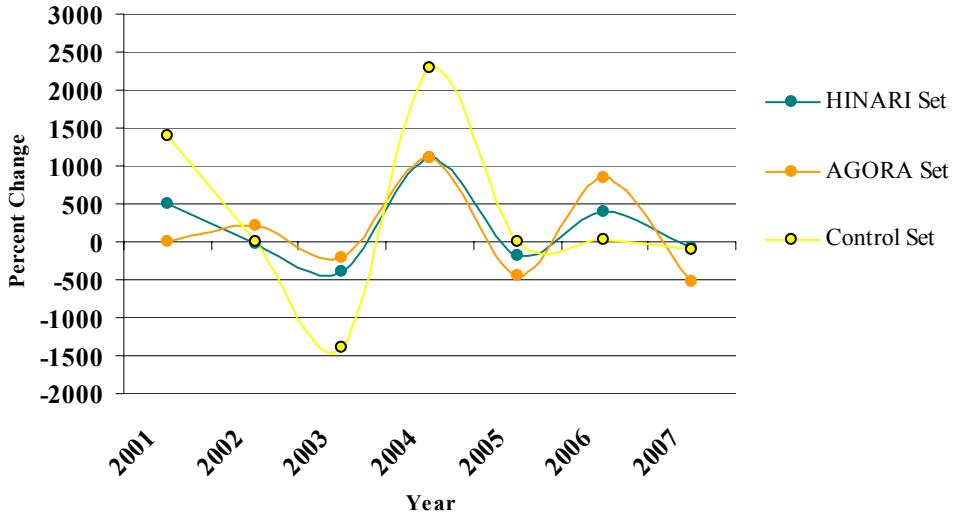


Figure C.10 Percent Change in Frequency of Citations Made by Djibouti Researchers

Table C.5 Average Percent Change in Frequency of Citations Made by Djibouti Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-68.8636	-131.6547	241.6667	-181.8711

C.1.1.4 Eritrea

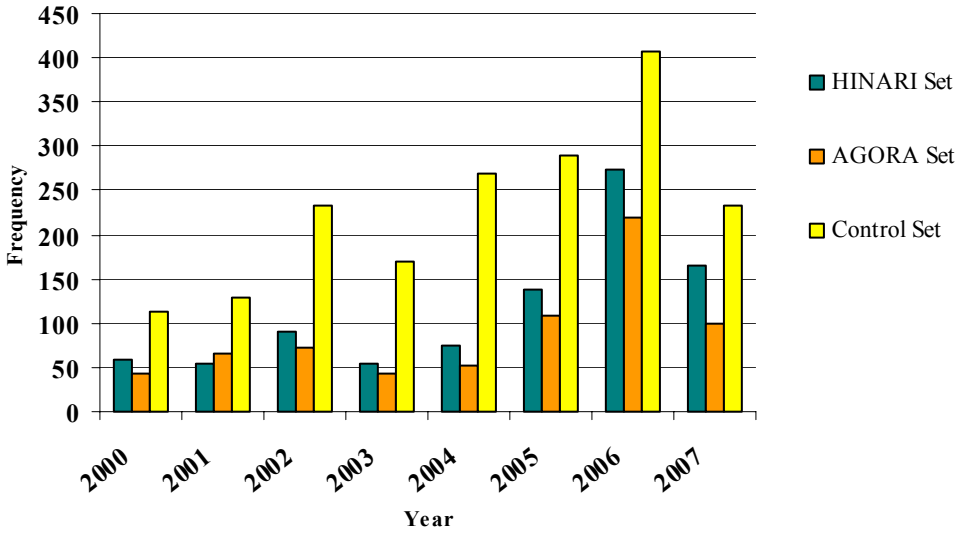


Figure C.11 Frequency of Citations Made by Eritrea Researchers

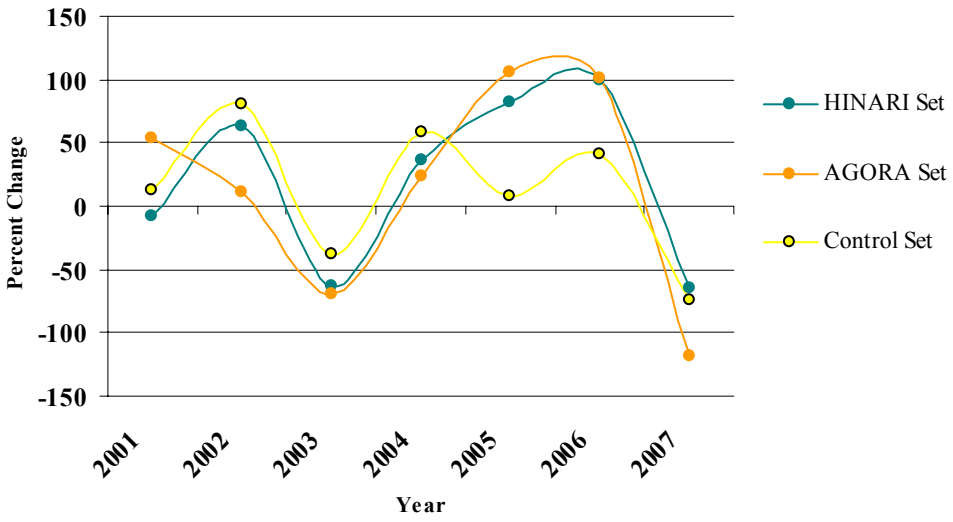


Figure C.12 Percent Change in Frequency of Citations Made by Eritrea Researchers

Table C.6 Average Percent Change in Frequency of Citations Made by Eritrea Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-10.1151	8.3063	29.5994	2.3725

C.1.1.5 Ethiopia

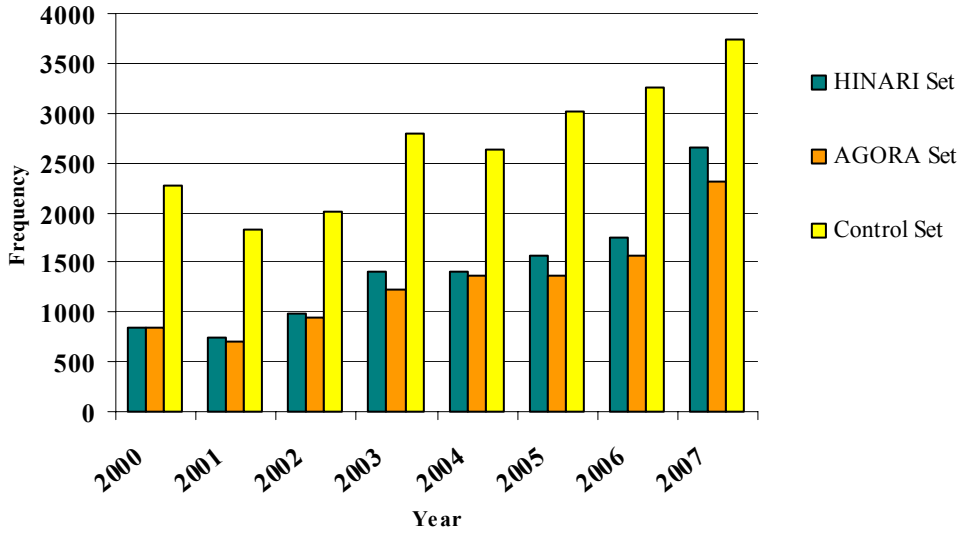


Figure C.13 Frequency of Citations Made by Ethiopia Researchers

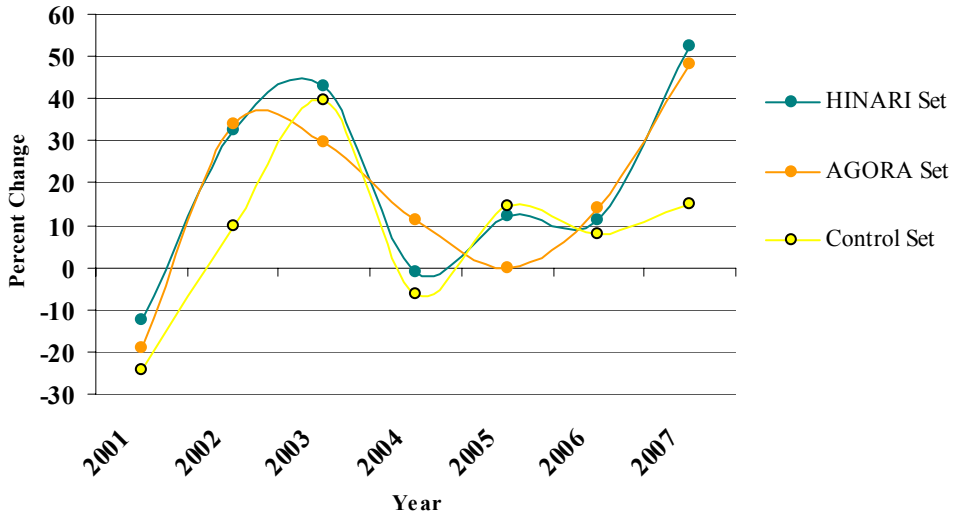


Figure C.14 Percent Change in Frequency of Citations Made by Ethiopia Researchers

Table C.7 Average Percent Change in Frequency of Citations Made by Ethiopia Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
13.5809	11.6124	3.5345	8.7588

C.1.1.5 Kenya

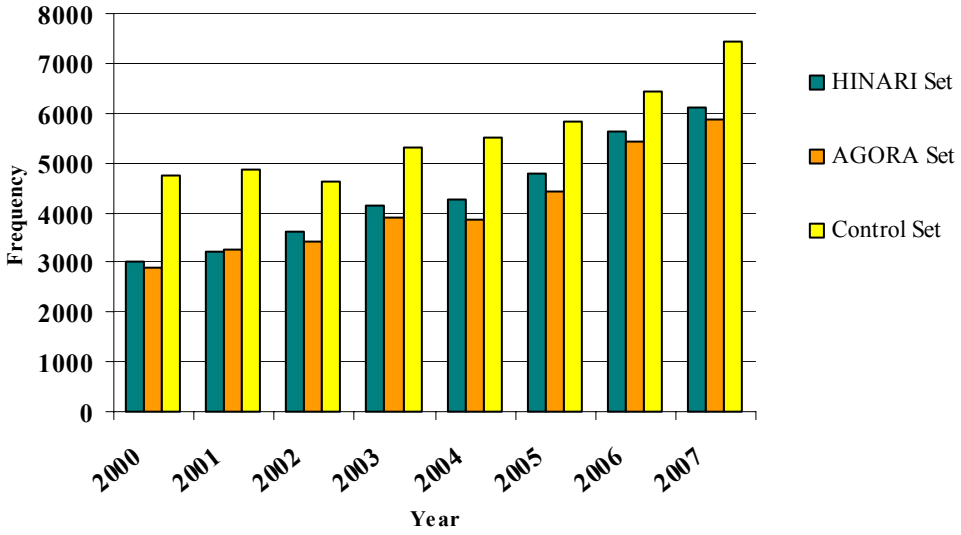


Figure C.15 Frequency of Citations Made by Kenya Researchers

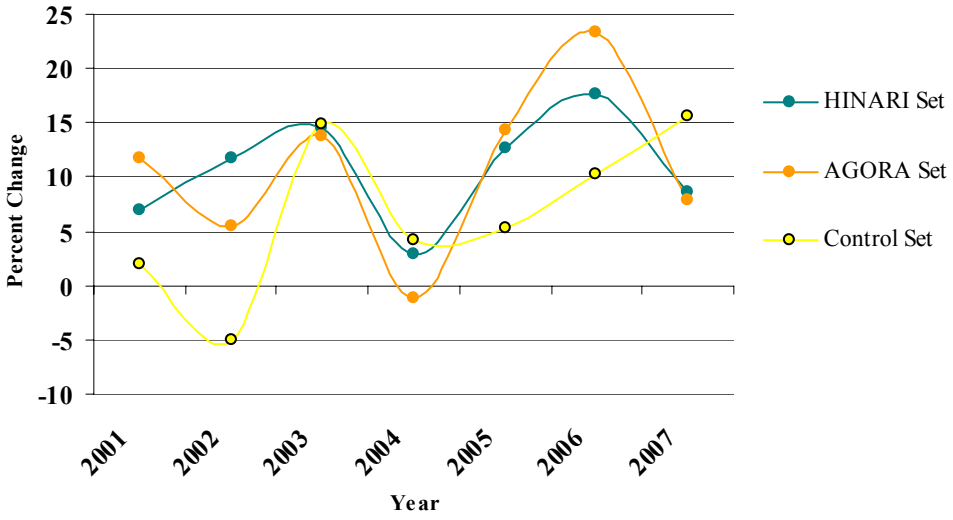


Figure C.16 Percent Change in Frequency of Citations Made by Kenya Researchers

Table C.8 Average Percent Change in Frequency of Citations Made by Kenya Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
1.9588	3.9861	0.7924	4.0437

C.1.1.6 Madagascar

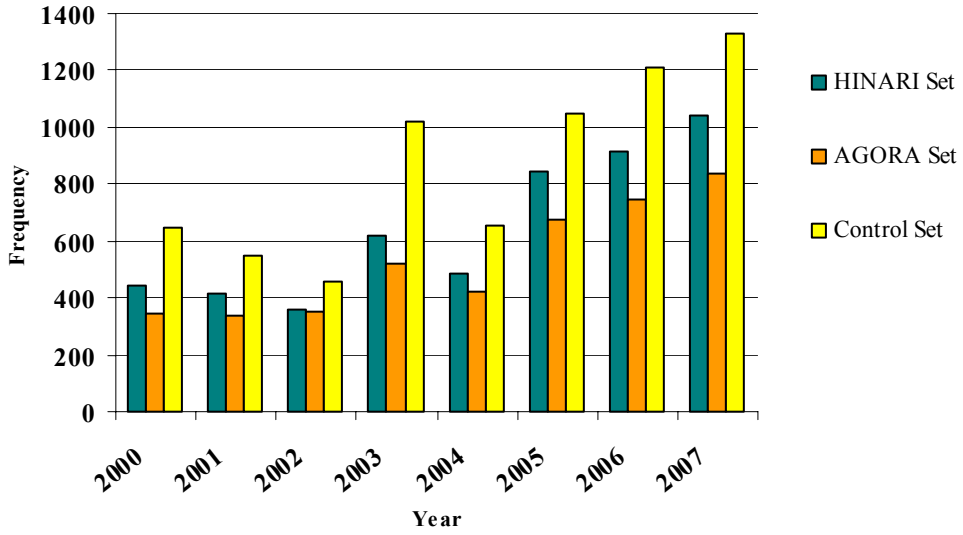


Figure C.17 Frequency of Citations Made by Madagascar Researchers

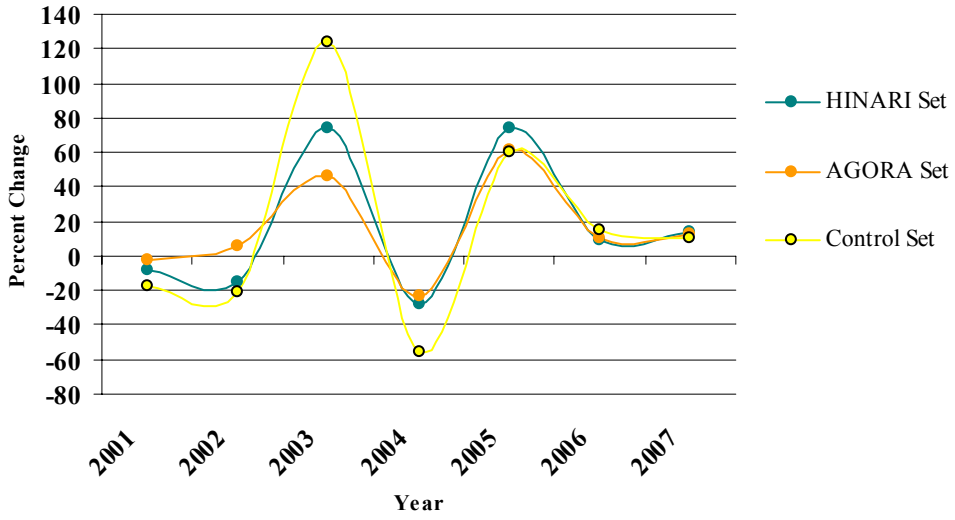


Figure C.18 Percent Change in Frequency of Citations Made by Madagascar Researchers

Table C.9 Average Percent Change in Frequency of Citations Made by Madagascar Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
40.2333	0.4221	-1.3466	-0.8187

C.1.1.7 Malawi

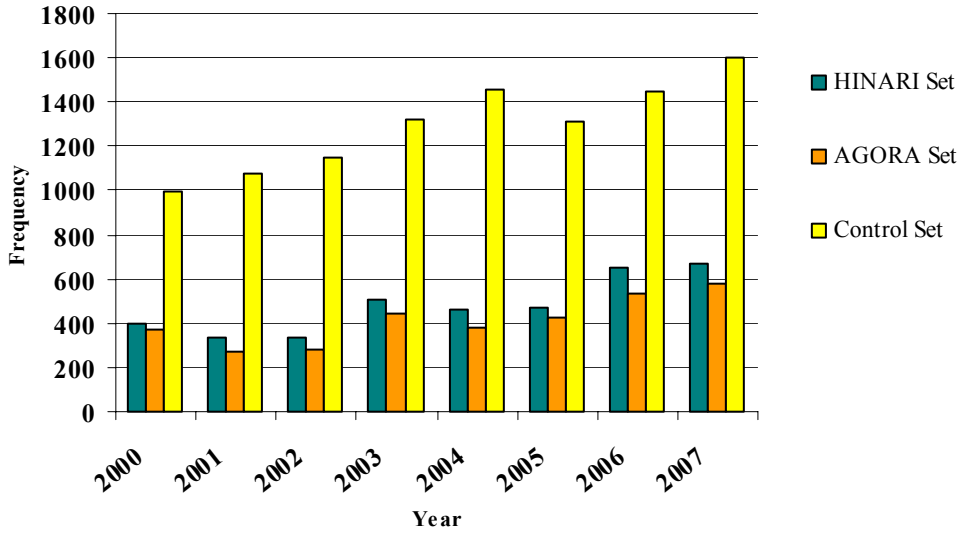


Figure C.19 Frequency of Citations Made by Malawi Researchers

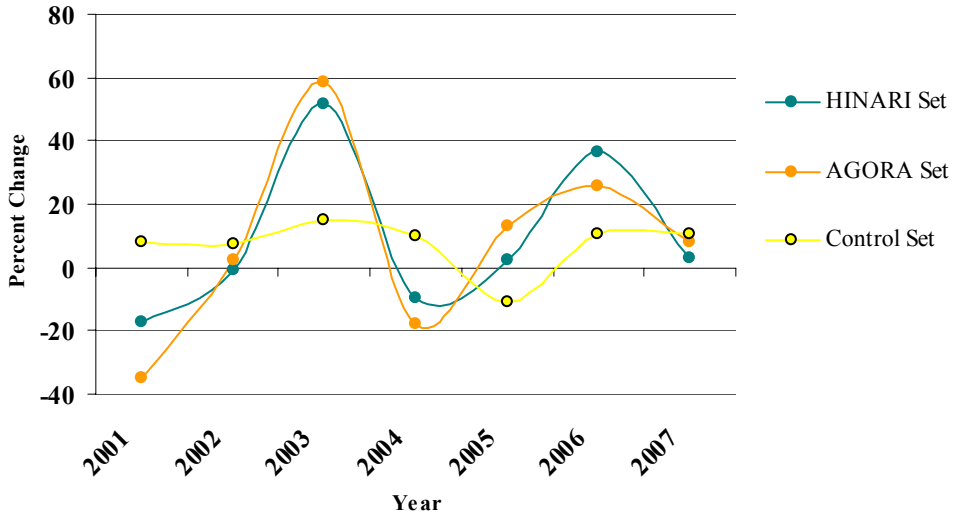


Figure C.20 Percent Change in Frequency of Citations Made by Malawi Researchers

Table C.10 Average Percent Change in Frequency of Citations Made by Malawi Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
25.6624	2.1628	-1.6732	0.6564

C.1.1.8 Mozambique

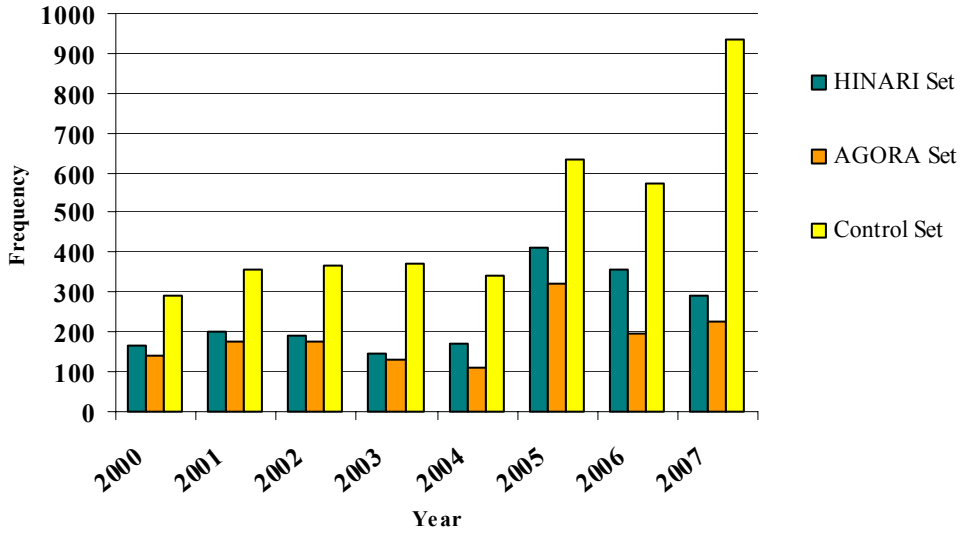


Figure C.21 Frequency of Citations Made by Mozambique Researchers

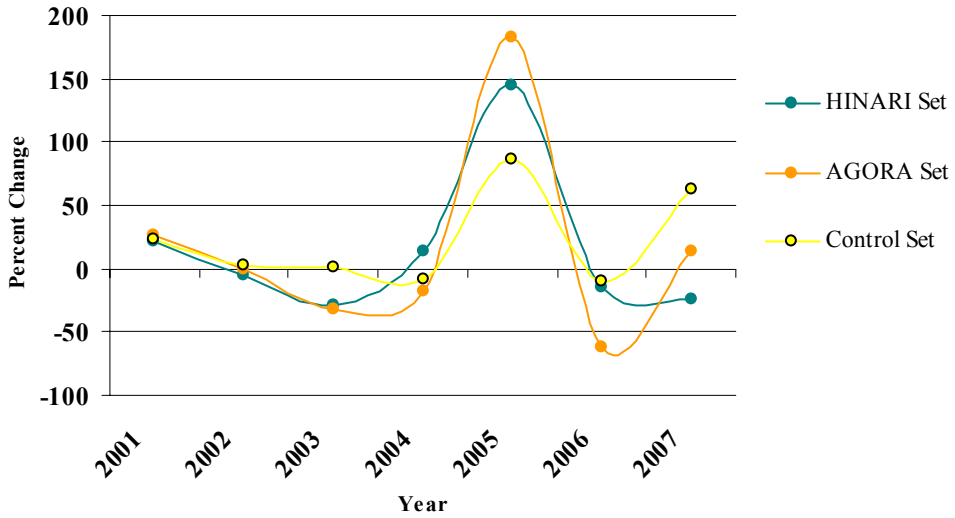


Figure C.22 Percent Change in Frequency of Citations Made by Mozambique Researchers

Table C.11 Average Percent Change in Frequency of Citations Made by Mozambique Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
9.9733	-6.9702	31.4073	-6.6061

C.1.1.9 Rwanda

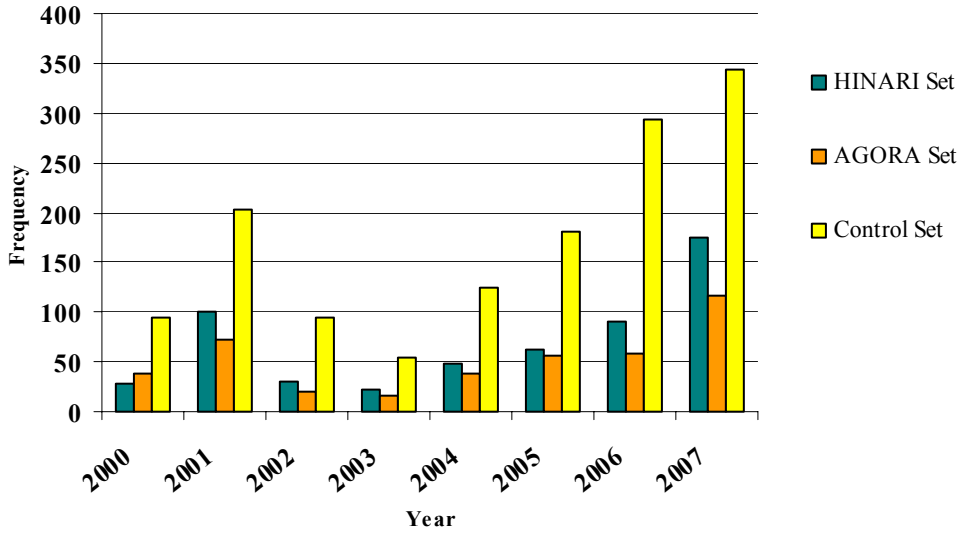


Figure C.23 Frequency of Citations Made by Rwanda Researchers

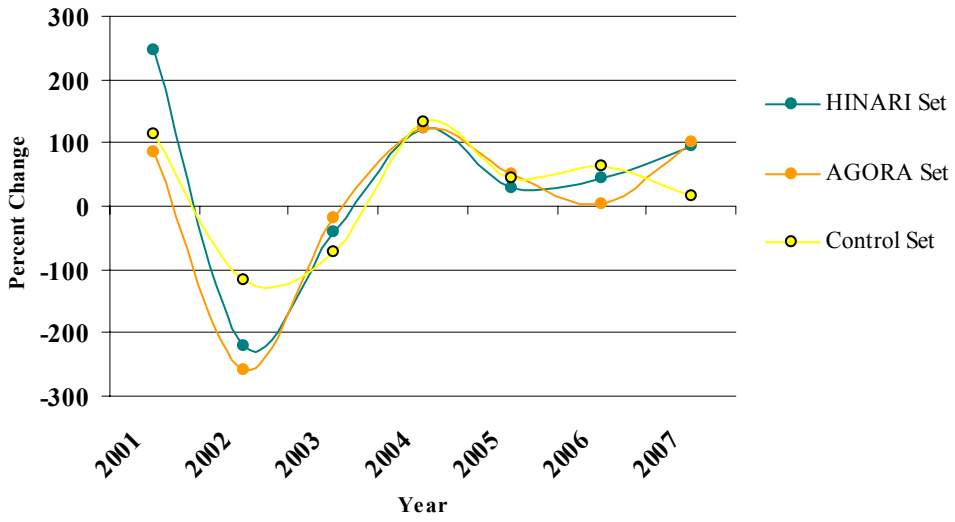


Figure C.24 Percent Change in Frequency of Citations Made by Rwanda Researchers

Table C.12 Average Percent Change in Frequency of Citations Made by Rwanda Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
38.4148	13.0103	133.1648	-13.8020

C.1.1.10 Somalia

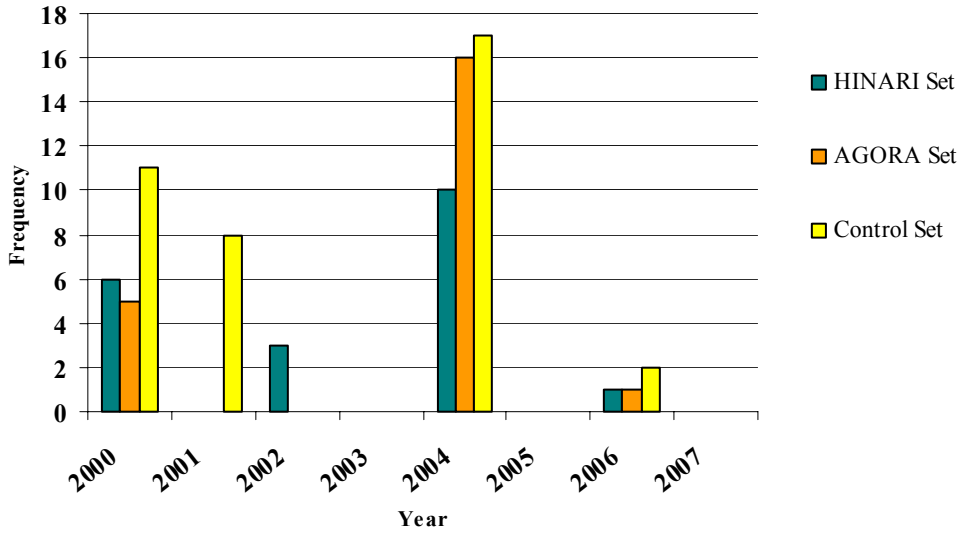


Figure C.25 Frequency of Citations Made by Somalia Researchers

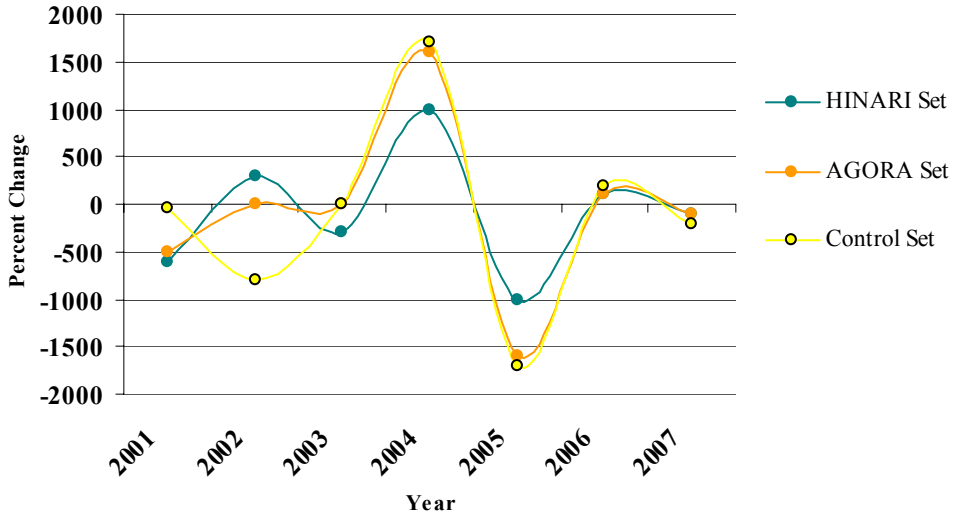


Figure C.26 Percent Change in Frequency of Citations Made by Somalia Researchers

Table C.13 Average Percent Change in Frequency of Citations Made by Somalia Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
90.0000	33.9286	166.6667	48.2143

C.1.1.11 Tanzania

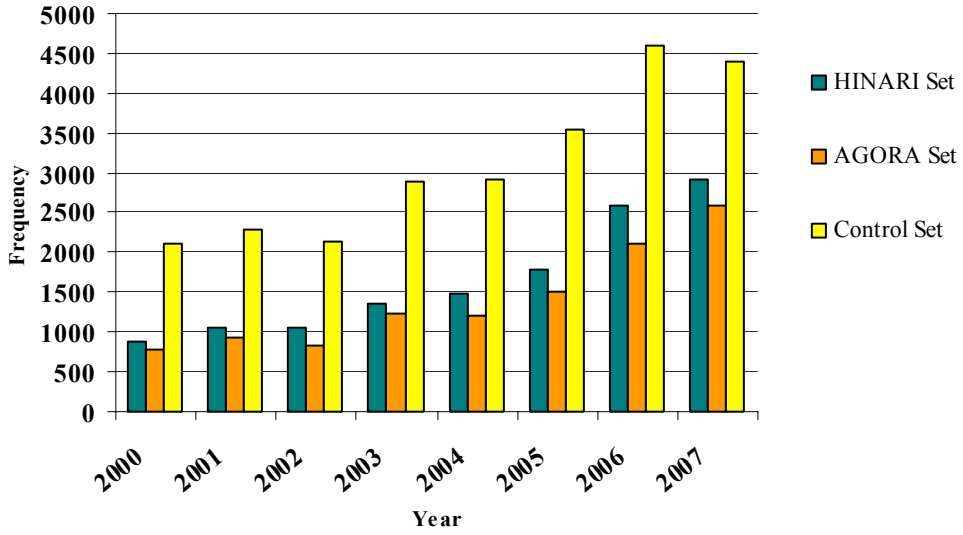


Figure C.27 Frequency of Citations Made by Tanzania Researchers

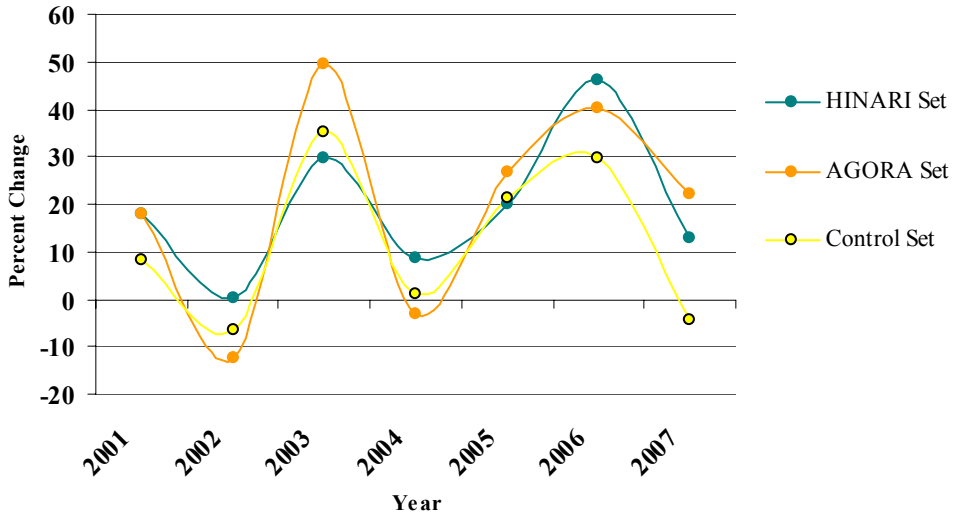


Figure C.28 Percent Change in Frequency of Citations Made by Tanzania Researchers

Table C.14 Average Percent Change in Frequency of Citations Made by Tanzania Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
14.3387	7.2762	3.0906	8.0513

C.1.1.12 Uganda

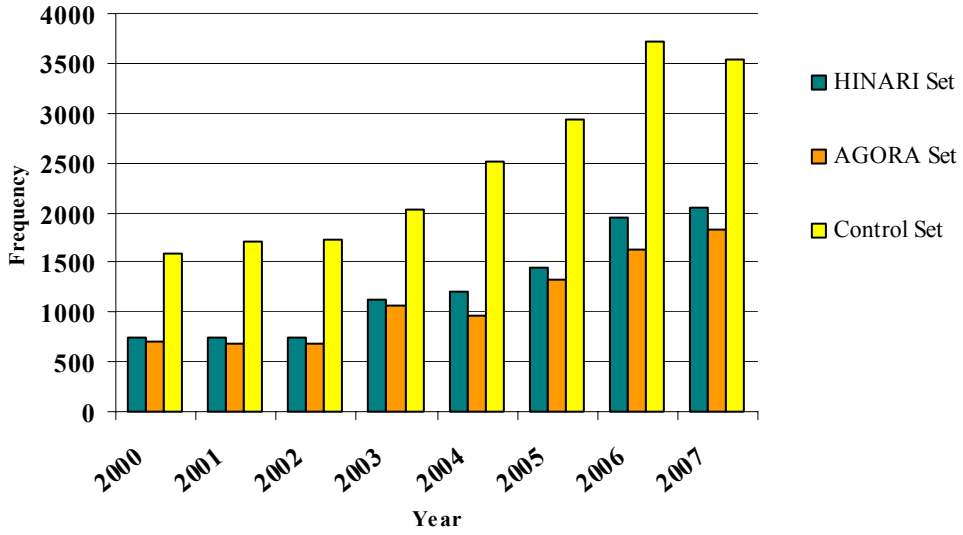


Figure C.29 Frequency of Citations Made by Uganda Researchers

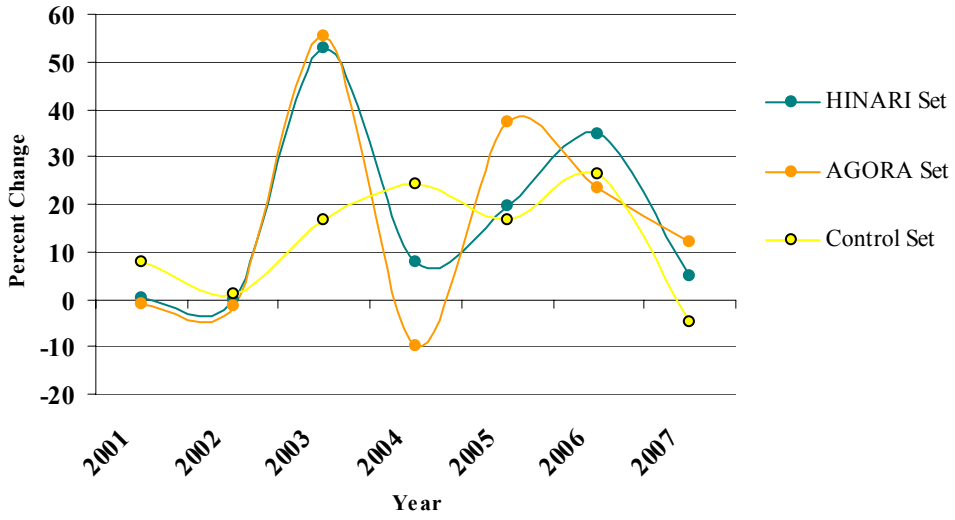


Figure C.30 Percent Change in Frequency of Citations Made by Uganda Researchers

Table C.15 Average Percent Change in Frequency of Citations Made by Uganda Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
24.0572	4.5450	-2.0071	3.9291

C.1.1.13 Zambia

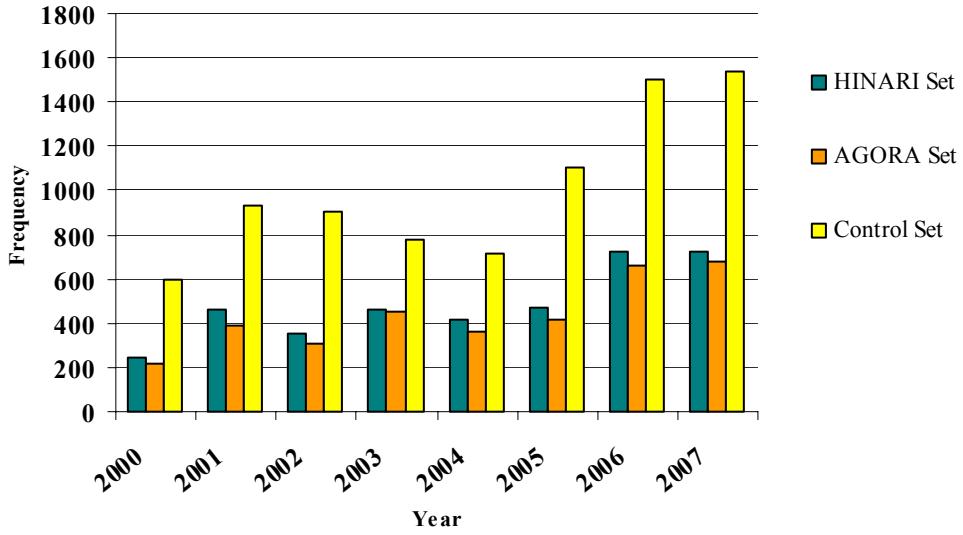


Figure C.31 Frequency of Citations Made by Zambia Researchers

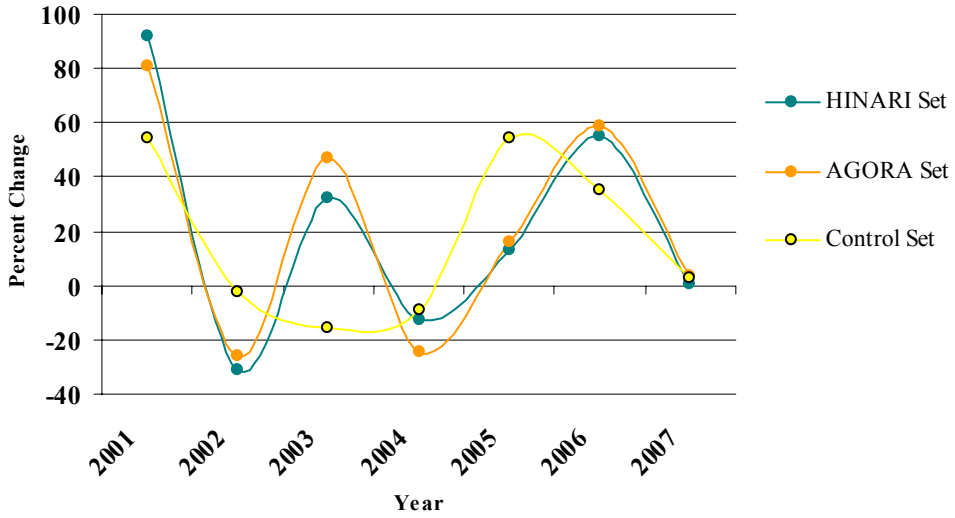


Figure C.32 Percent Change in Frequency of Citations Made by Zambia Researchers

Table C.16 Average Percent Change in Frequency of Citations Made by Zambia Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-12.6230	4.2192	-20.7113	5.0060

C.1.1.14 Zimbabwe

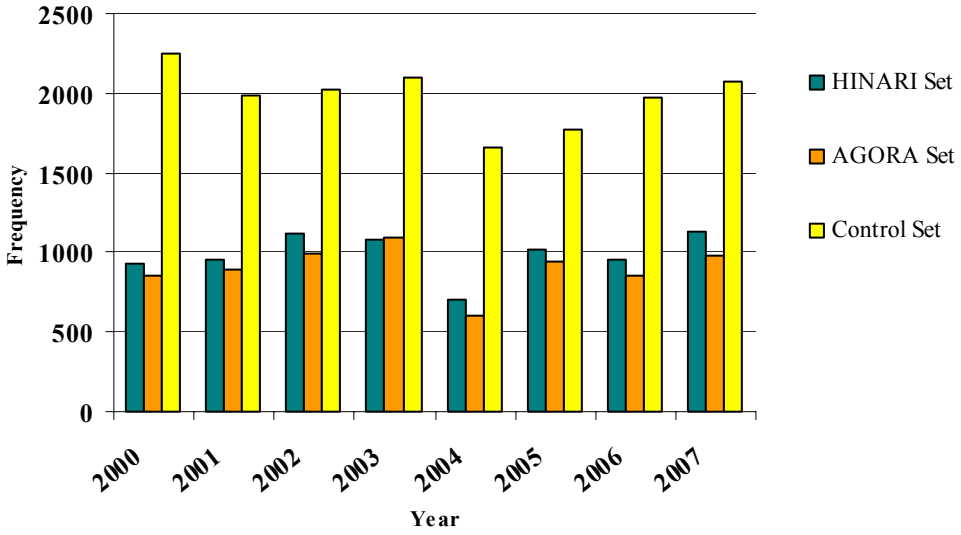


Figure C.33 Frequency of Citations Made by Zimbabwe Researchers

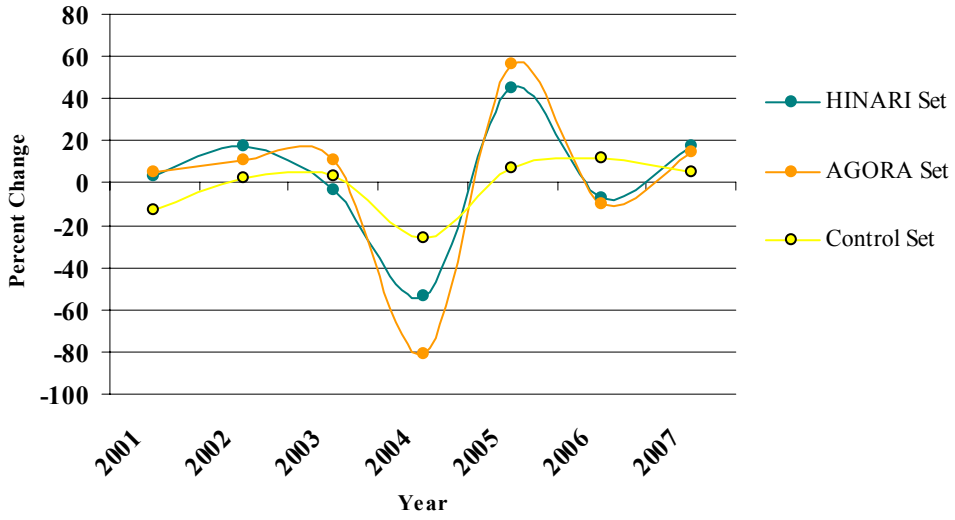


Figure C.34 Percent Change in Frequency of Citations Made by Zimbabwe Researchers

Table C.17 Average Percent Change in Frequency of Citations Made by Zimbabwe Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-10.2223	4.2145	-13.9458	2.3752

C.1.2 Middle Africa

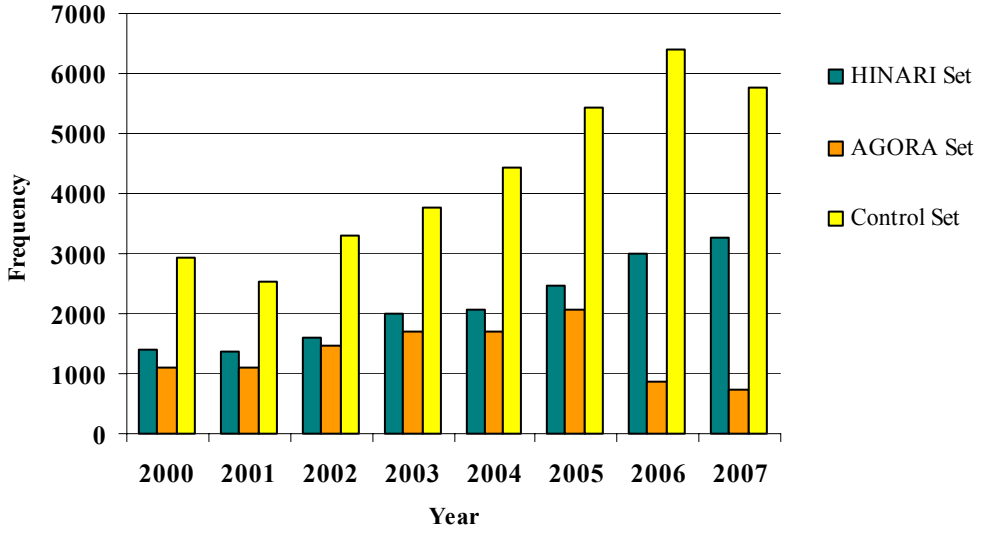


Figure C.35 Frequency of Citations Made by Eligible Middle African Researchers

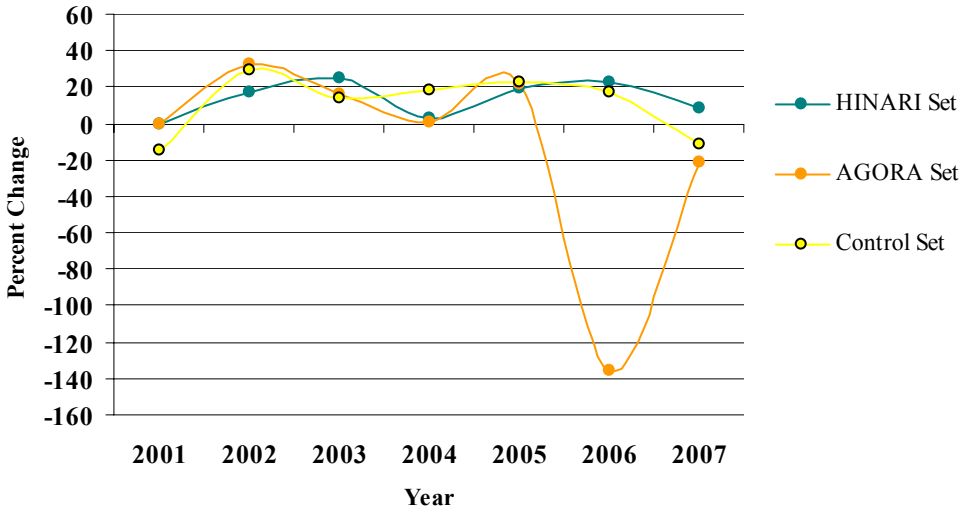


Figure C.36 Percent Change in Frequency of Citations Made by Eligible Middle African Researchers

Table C.18 Average Percent Change in Frequency of Citations Made by Eligible Middle African Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
7.1455	2.6041	-49.6785	-23.3592

C.1.2.1 Angola

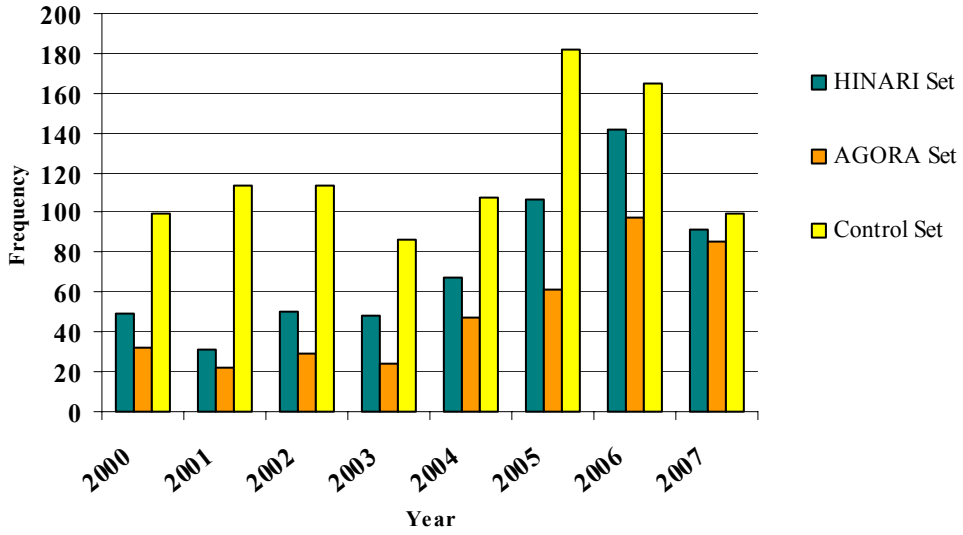


Figure C.37 Frequency of Citations Made by Angola Researchers

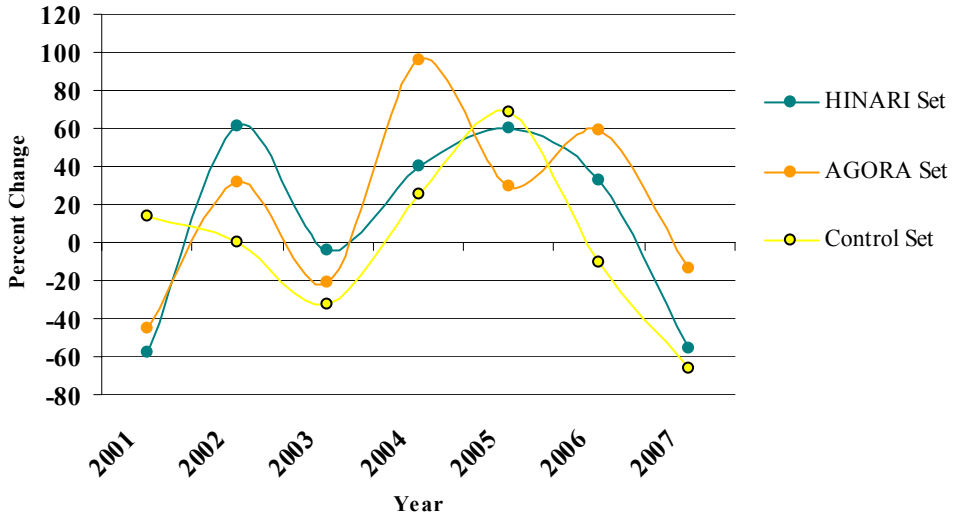


Figure C.38 Percent Change in Frequency of Citations Made by Angola Researchers

Table C.19 Average Percent Change in Frequency of Citations Made by Angola Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
12.7440	10.9197	54.1197	19.6396

C.1.2.2 Cameroon

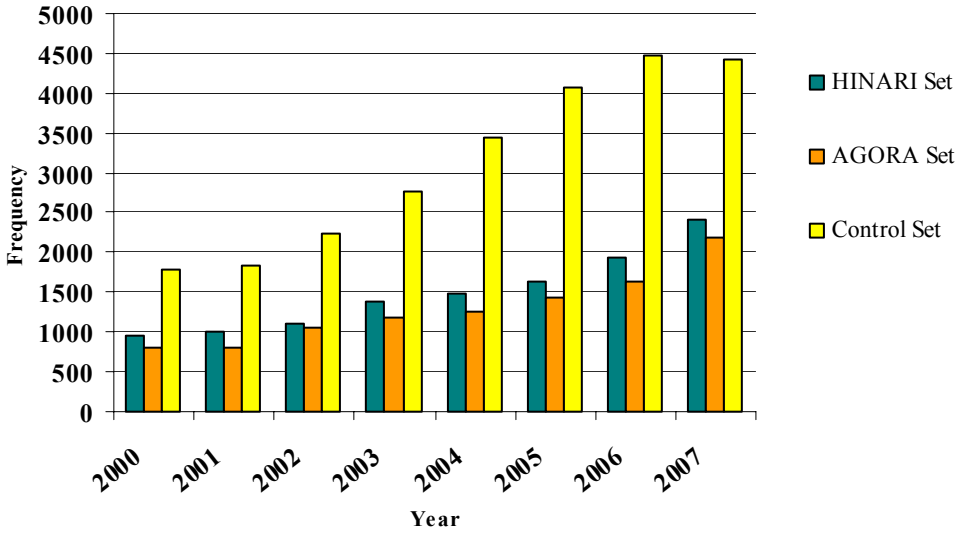


Figure C.39 Frequency of Citations Made by Cameroon Researchers

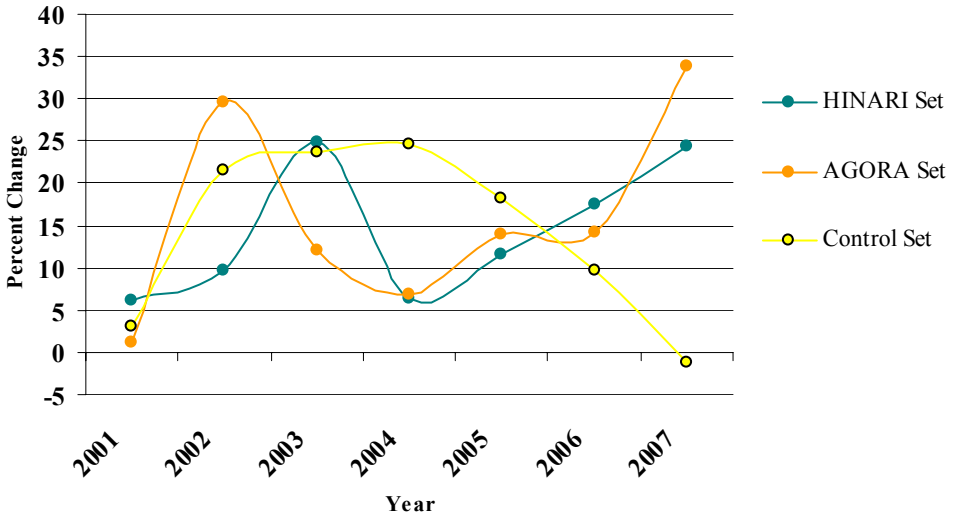


Figure C.40 Percent Change in Frequency of Citations Made by Cameroon Researchers

Table C.20 Average Percent Change in Frequency of Citations Made by Cameroon Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
9.0395	0.1072	2.9167	1.7139

C.1.2.3 Central African Republic

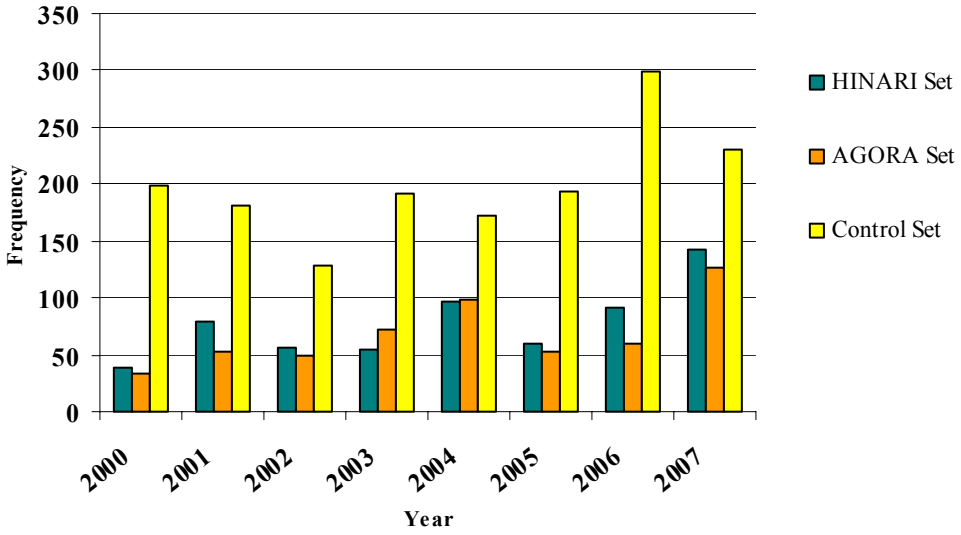


Figure C.41 Frequency of Citations Made by Central African Republic Researchers

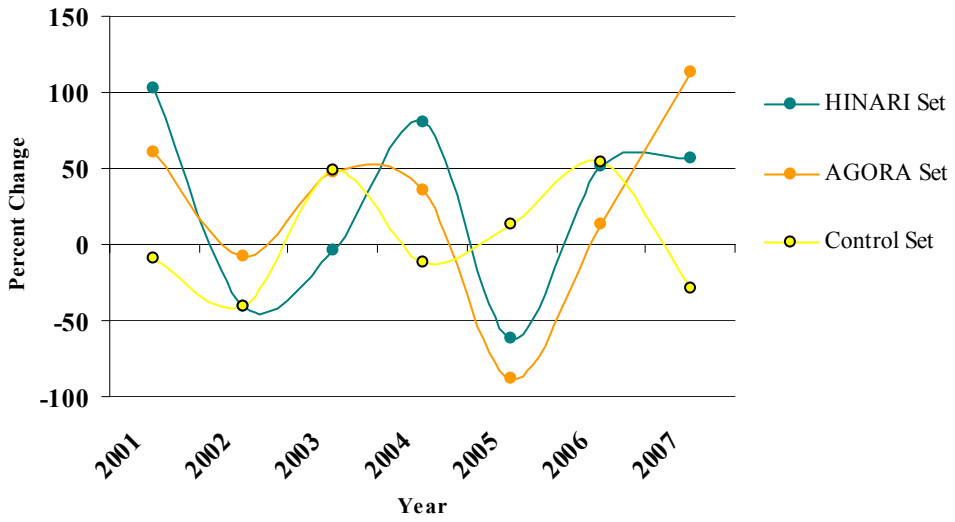


Figure C.42 Percent Change in Frequency of Citations Made by Central African Republic Researchers

Table C.21 Average Percent Change in Frequency of Citations Made by Central African Republic Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-6.1326	22.8216	-14.4596	21.3203

C.1.2.4 Chad

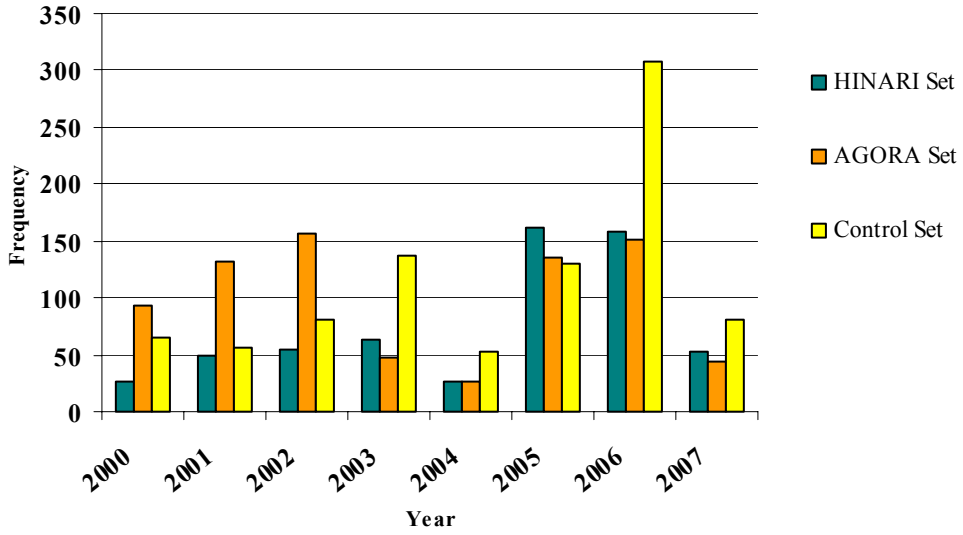


Figure C.43 Frequency of Citations Made by Chad Researchers

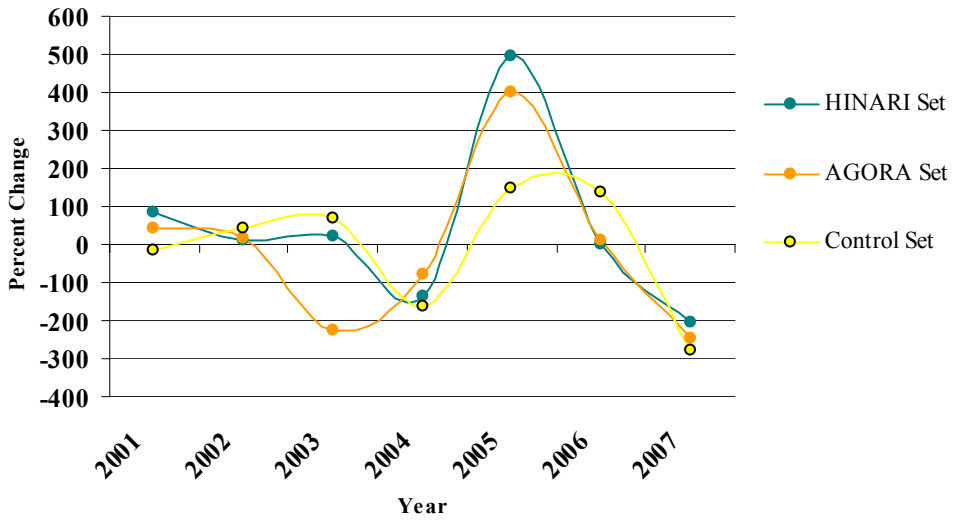


Figure C.44 Percent Change in Frequency of Citations Made by Chad Researchers

Table C.22 Average Percent Change in Frequency of Citations Made by Chad Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-12.1860	46.3280	77.8043	-2.5649

C.1.2.5 Congo

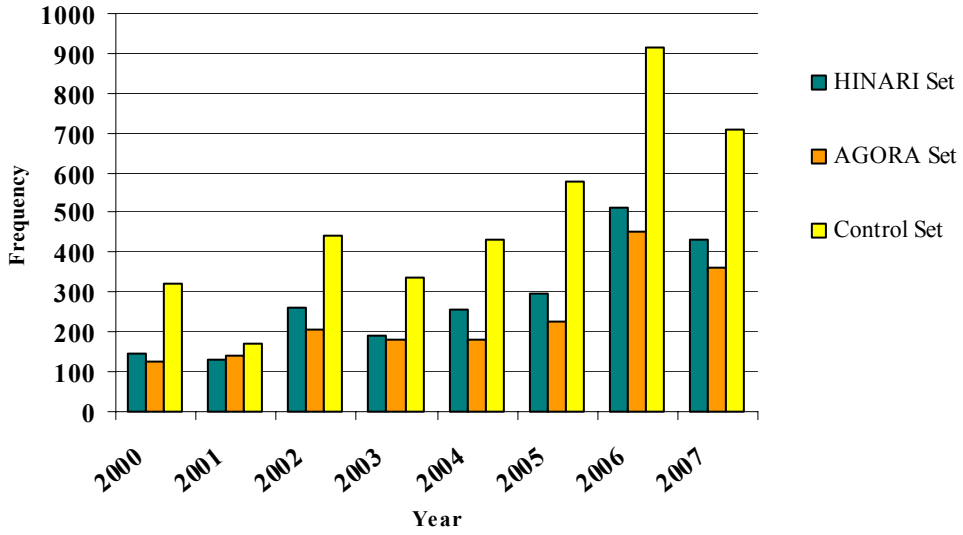


Figure C.45 Frequency of Citations Made by Congo Researchers

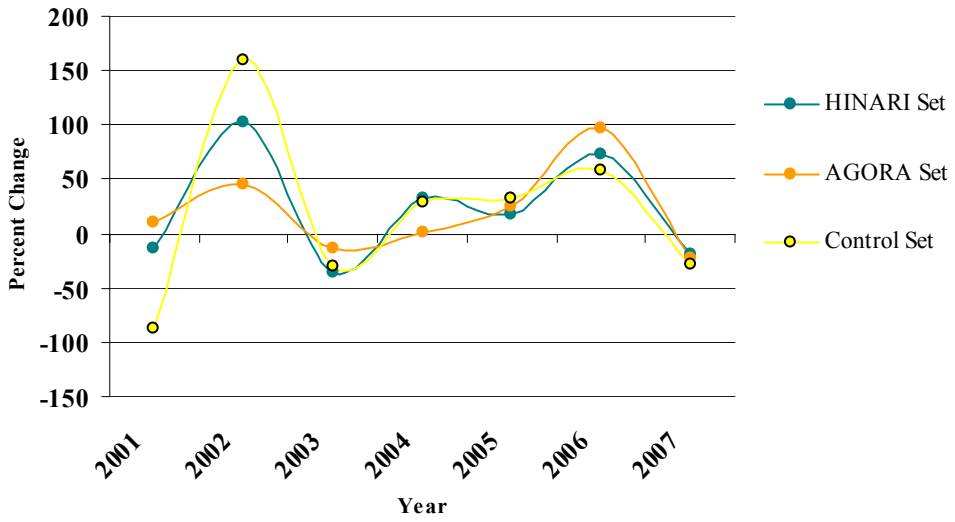


Figure C.46 Percent Change in Frequency of Citations Made by Congo Researchers

Table C.23 Average Percent Change in Frequency of Citations Made by Congo Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-31.1133	3.5019	10.8776	1.3825

C.1.2.6 Democratic Republic of the Congo

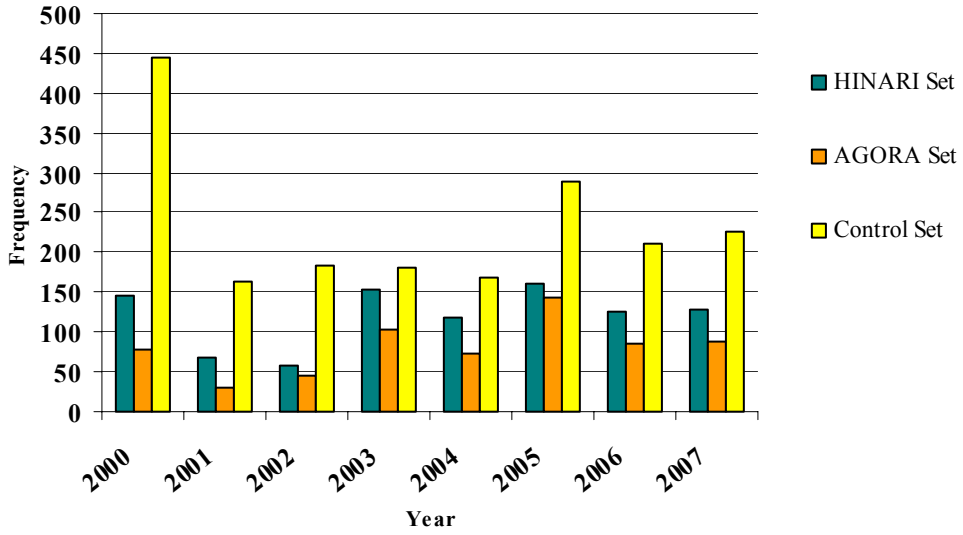


Figure C.47 Frequency of Citations Made by Democratic Republic of the Congo Researchers

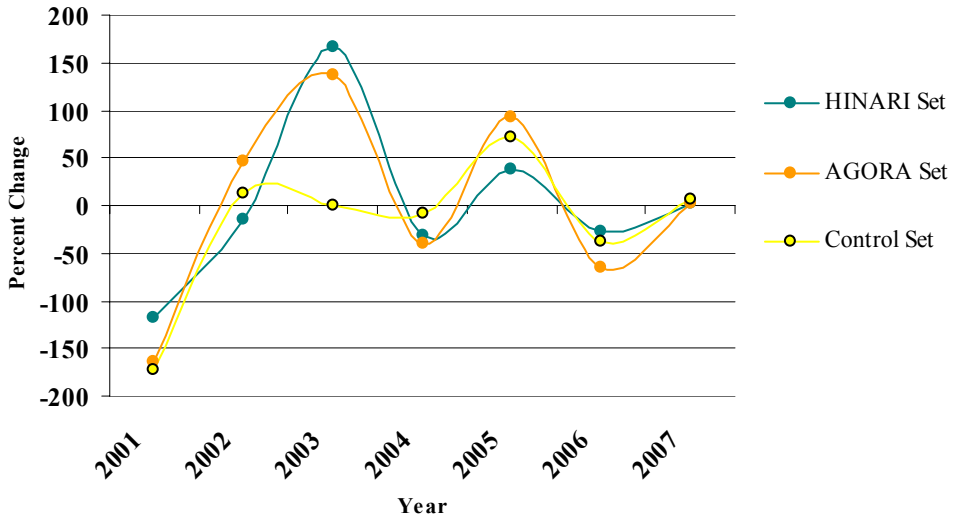


Figure C.48 Percent Change in Frequency of Citations Made by Democratic Republic of the Congo Researchers

Table C.24 Average Percent Change in Frequency of Citations Made by Democratic Republic of the Congo Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
95.7758	19.9389	-9.7162	19.2550

C.1.2.7 Equatorial Guinea

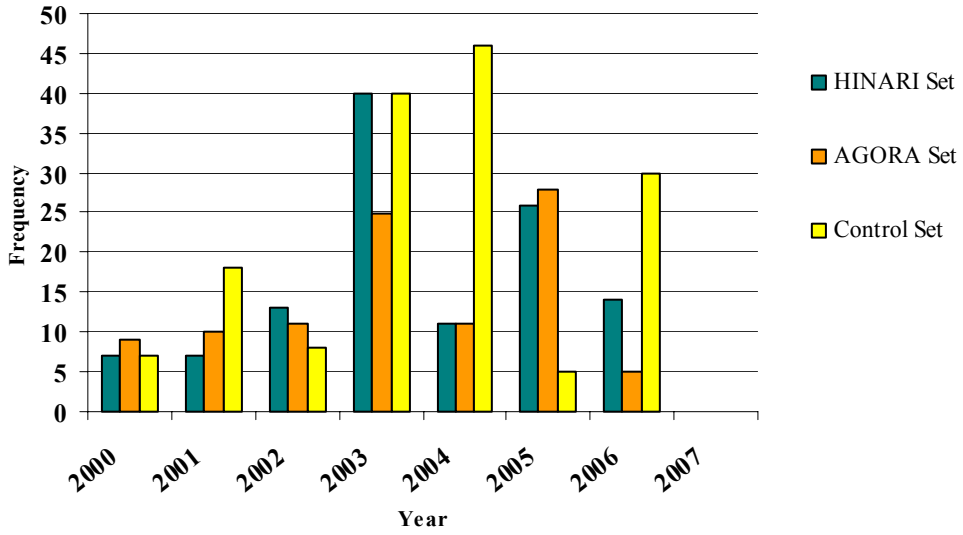


Figure C.49 Frequency of Citations Made by Equatorial Guinea Researchers

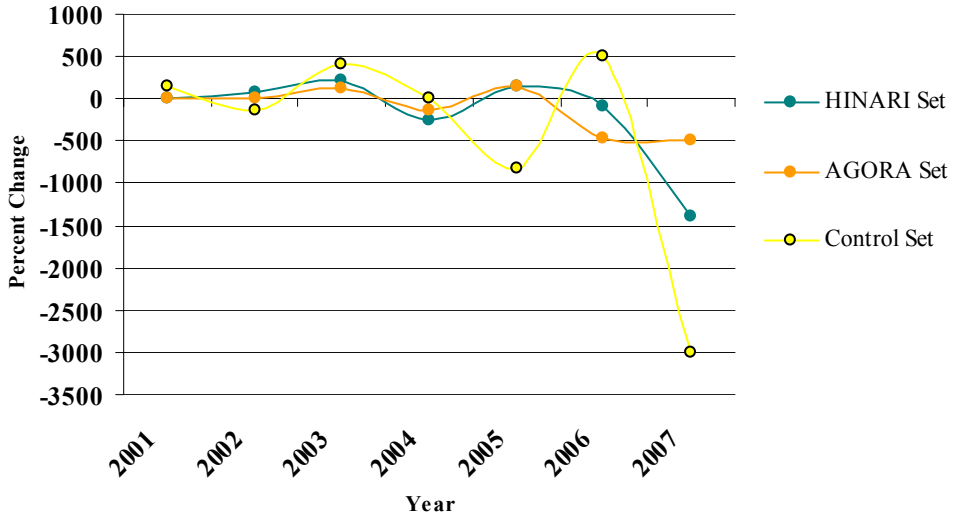


Figure C.50 Percent Change in Frequency of Citations Made by Equatorial Guinea Researchers

Table C.25 Average Percent Change in Frequency of Citations Made by Equatorial Guinea Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-323.9161	221.8967	-282.6431	298.3591

C.1.2.8 Sao Tome and Principe

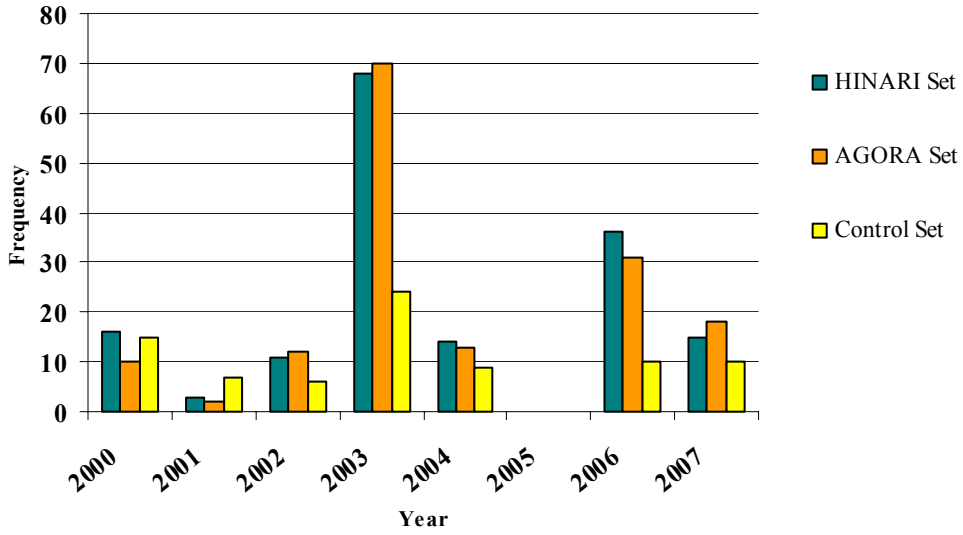


Figure C.51 Frequency of Citations Made by Sao Tome and Principe Researchers

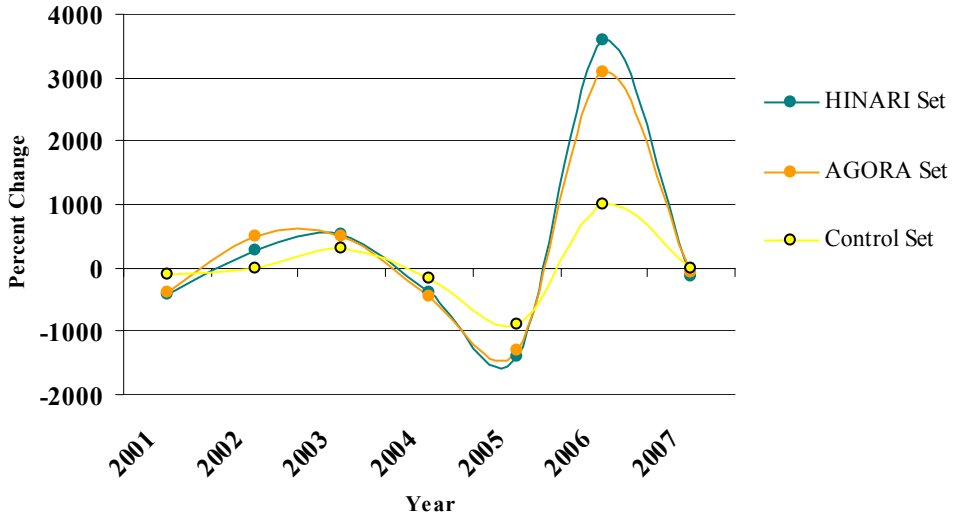


Figure C.52 Percent Change in Frequency of Citations Made by Sao Tome and Principe Researchers

Table C.26 Average Percent Change in Frequency of Citations Made by Sao Tome and Principe Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
521.8268	274.7743	127.8846	252.8955

C.1.3 Northern Africa

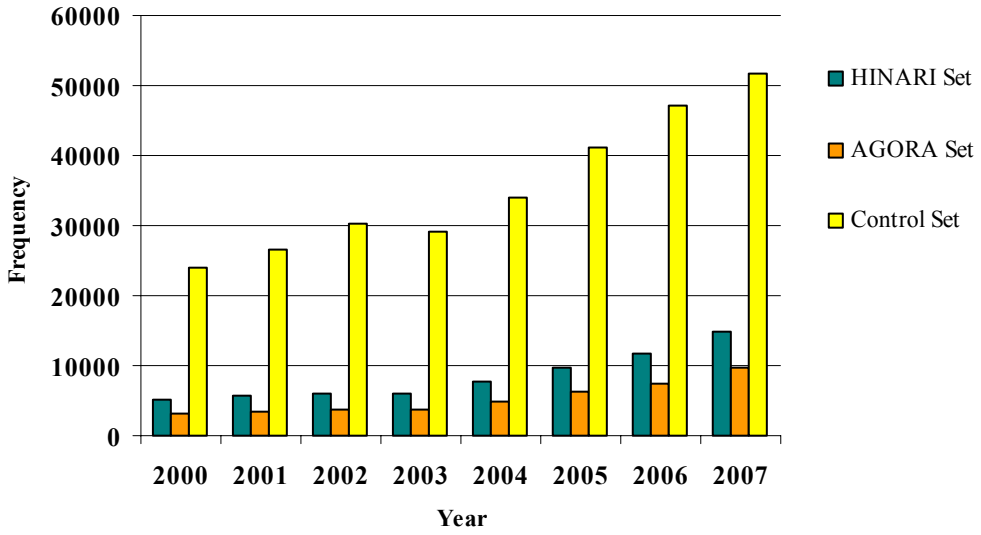


Figure C.53 Frequency of Citations Made by Eligible Northern Africa Researchers

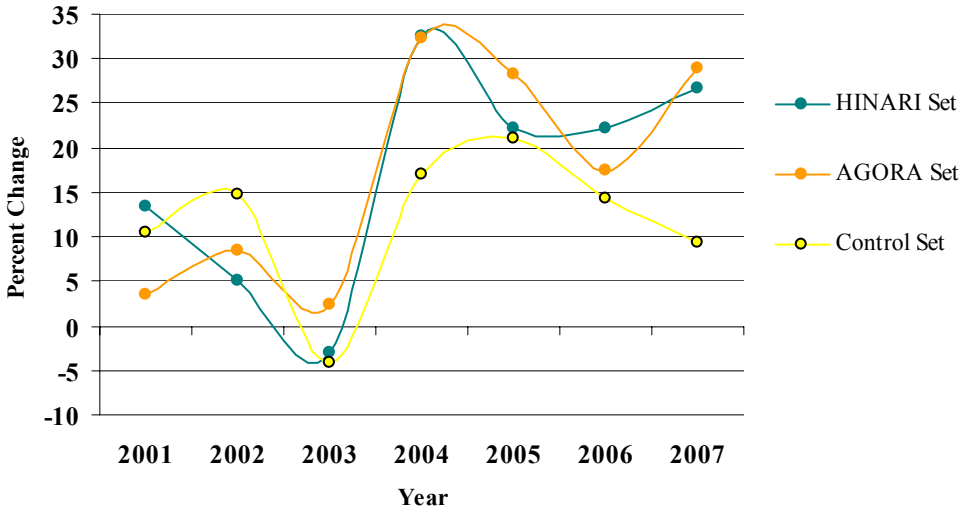


Figure C.54 Percent Change in Frequency of Citations Made by Eligible Northern Africa Researchers

Table C.27 Average Percent Change in Frequency of Citations Made by Eligible Northern Africa Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
10.8378	5.1774	21.9817	5.4259

C.1.3.1 Algeria

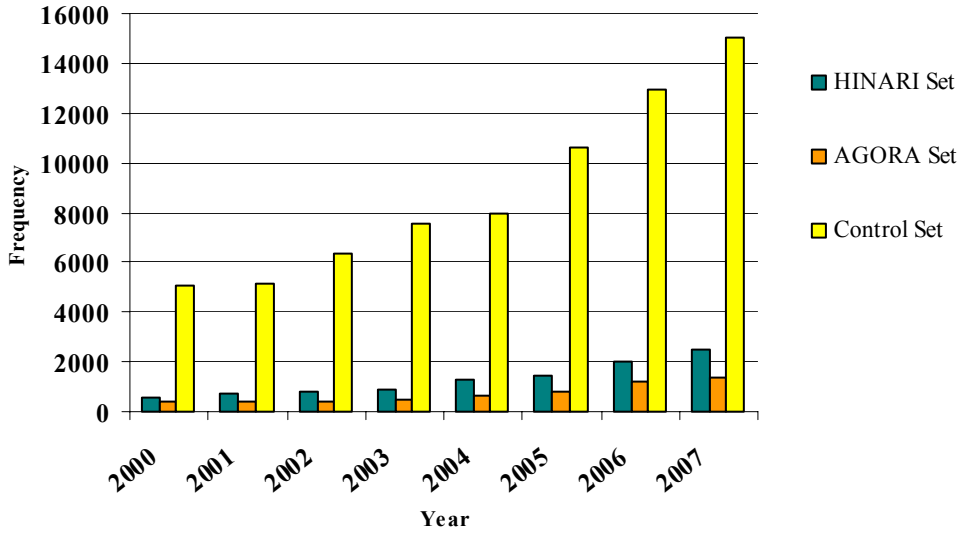


Figure C.55 Frequency of Citations Made by Algeria Researchers

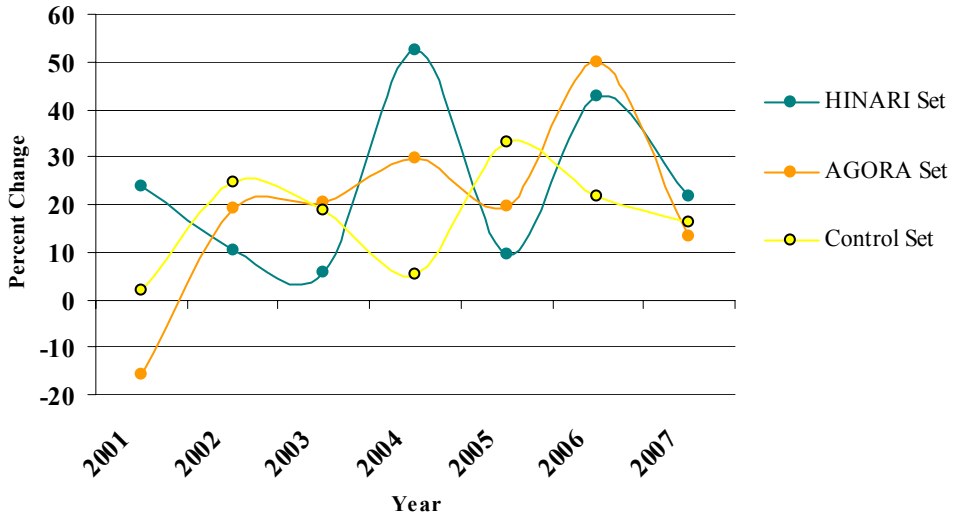


Figure C.56 Percent Change in Frequency of Citations Made by Algeria Researchers

Table C.28 Average Percent Change in Frequency of Citations Made by Algeria Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
9.2550	6.4275	20.1682	2.1159

C.1.3.2 Morocco

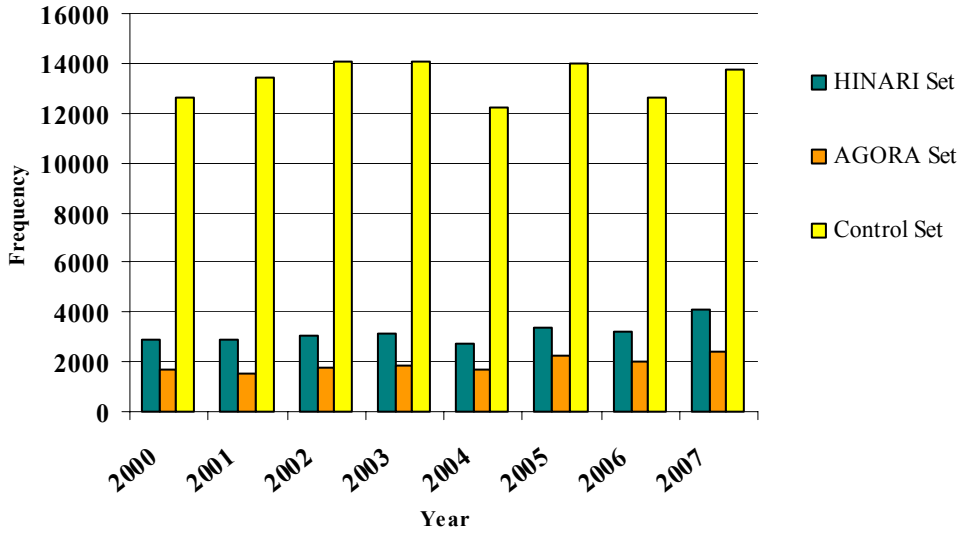


Figure C.57 Frequency of Citations Made by Morocco Researchers

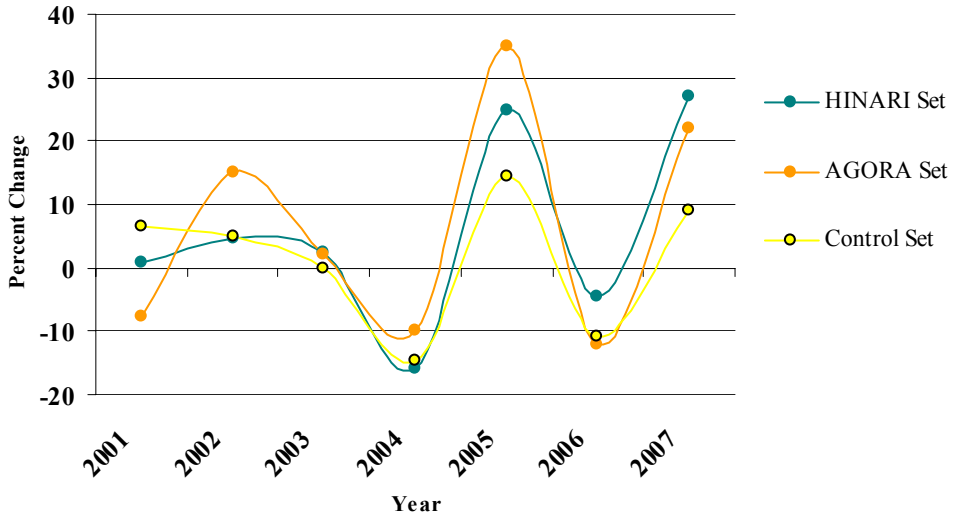


Figure C.58 Percent Change in Frequency of Citations Made by Morocco Researchers

Table C.29 Average Percent Change in Frequency of Citations Made by Morocco Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
4.0419	4.3233	5.5583	5.0293

C.1.3.3 Sudan

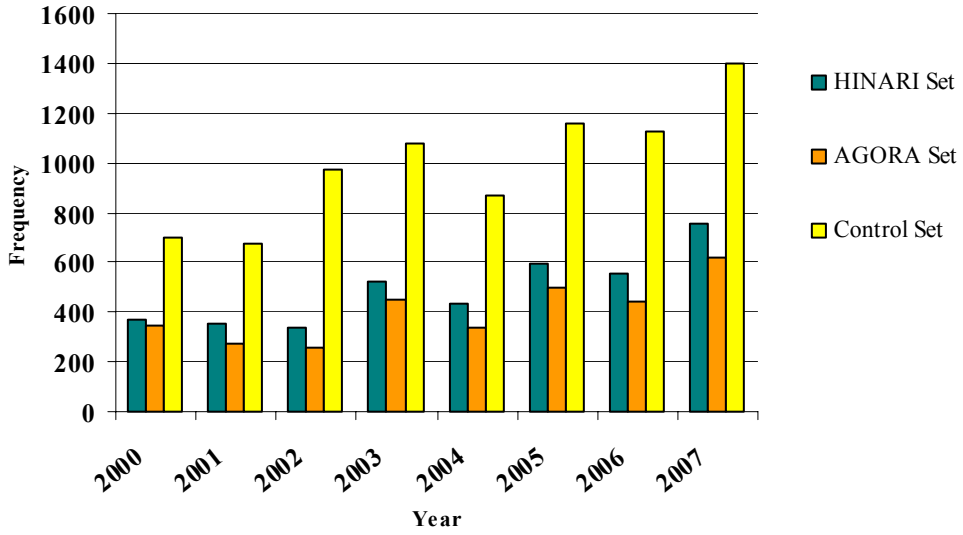


Figure C.59 Frequency of Citations Made by Sudan Researchers

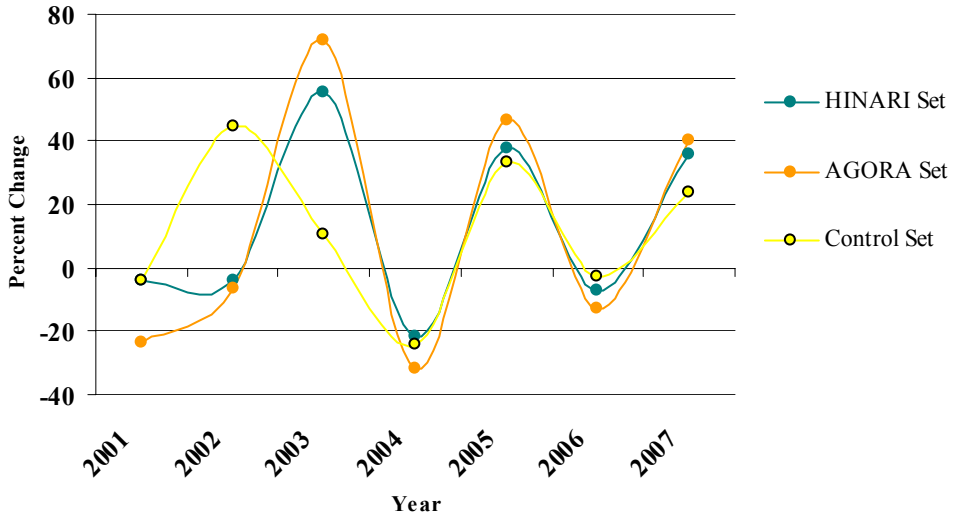


Figure C.60 Percent Change in Frequency of Citations Made by Sudan Researchers

Table C.30 Average Percent Change in Frequency of Citations Made by Sudan Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
24.0722	1.4982	-3.3696	0.4111

C.1.3.4 Tunisia

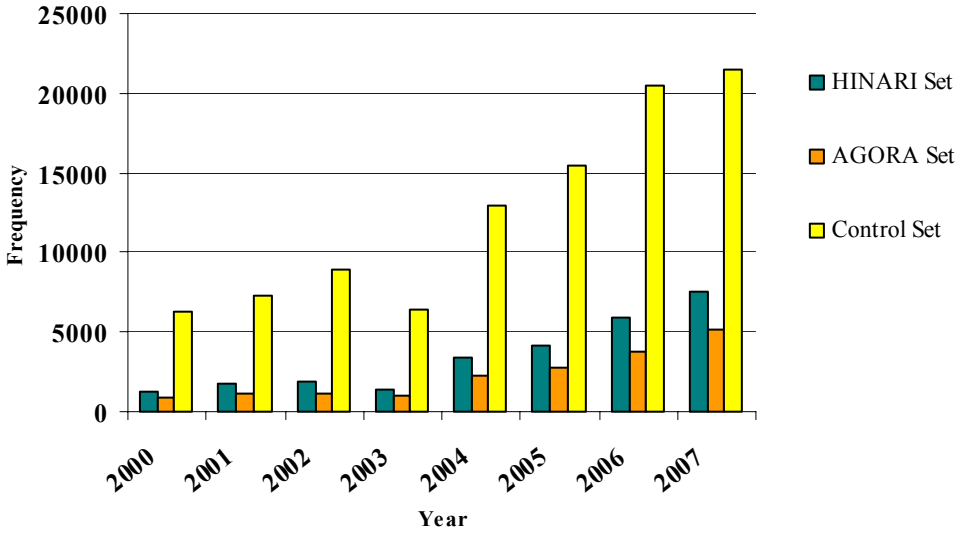


Figure C.61 Frequency of Citations Made by Tunisia Researchers

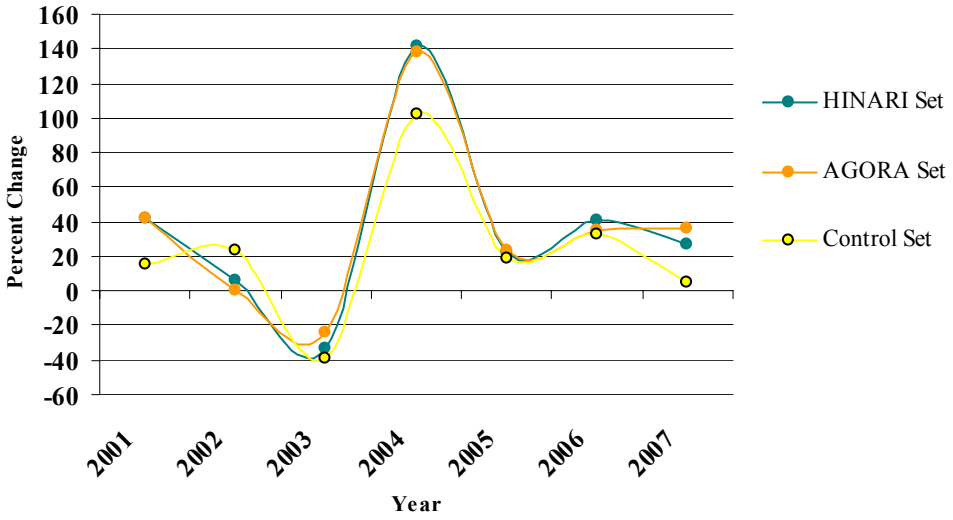


Figure C.62 Percent Change in Frequency of Citations Made by Tunisia Researchers

Table C.31 Average Percent Change in Frequency of Citations Made by Tunisia Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
15.6697	12.5753	52.2357	13.2457

C.1.4 Southern Africa

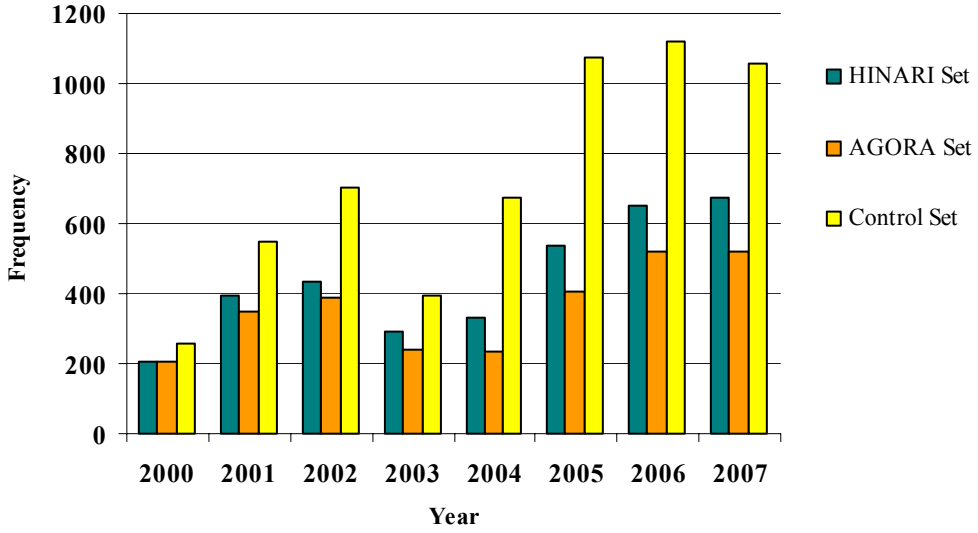


Figure C.63 Frequency of Citations Made by Eligible Southern Africa Researchers

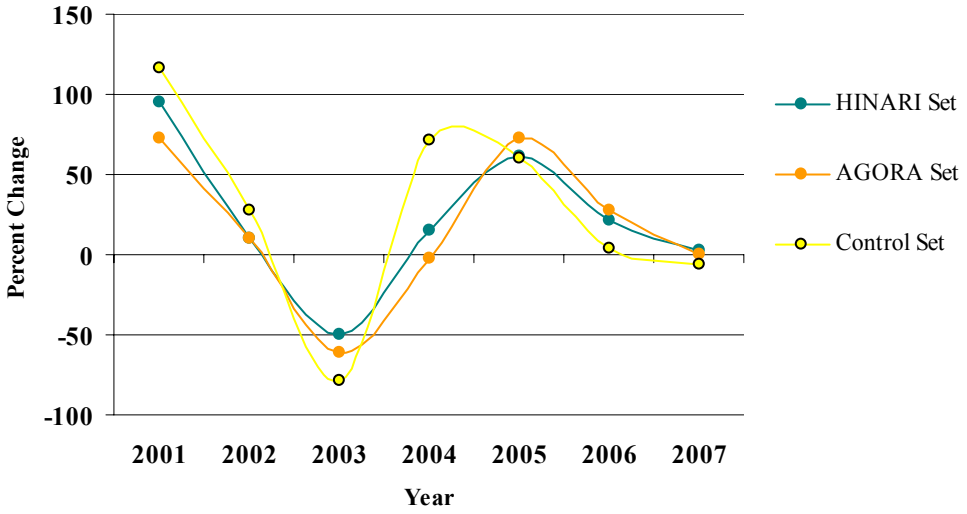


Figure C.64 Percent Change in Frequency of Citations Made by Eligible Southern Africa Researchers

Table C.32 Average Percent Change in Frequency of Citations Made by Eligible Southern Africa Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-42.3807	-5.4865	17.6459	-10.5472

C.1.4.1 Lesotho

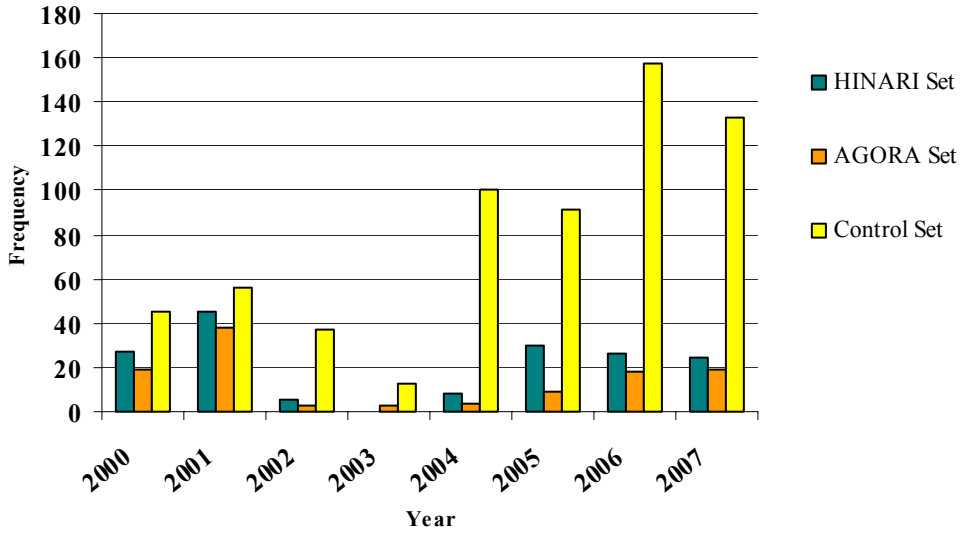


Figure C.65 Frequency of Citations Made by Lesotho Researchers

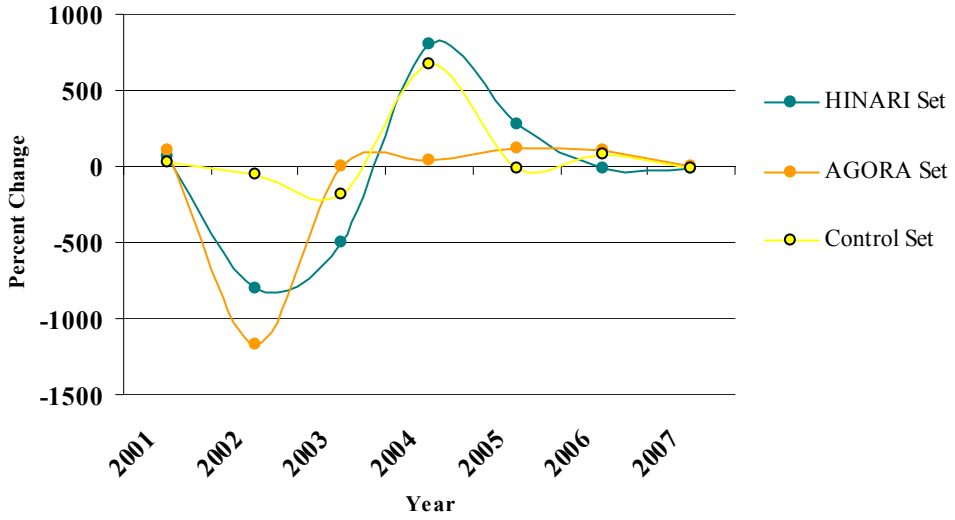


Figure C.66 Percent Change in Frequency of Citations Made by Lesotho Researchers

Table C.33 Average Percent Change in Frequency of Citations Made by Lesotho Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
476.9231	-97.7646	421.5278	-186.4398

C.1.4.2 Namibia

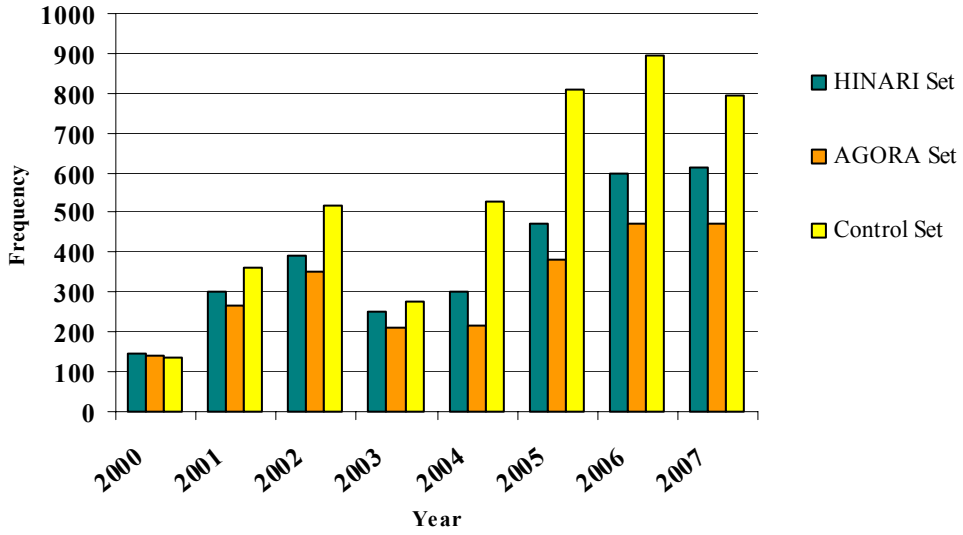


Figure C.67 Frequency of Citations Made by Namibia Researchers

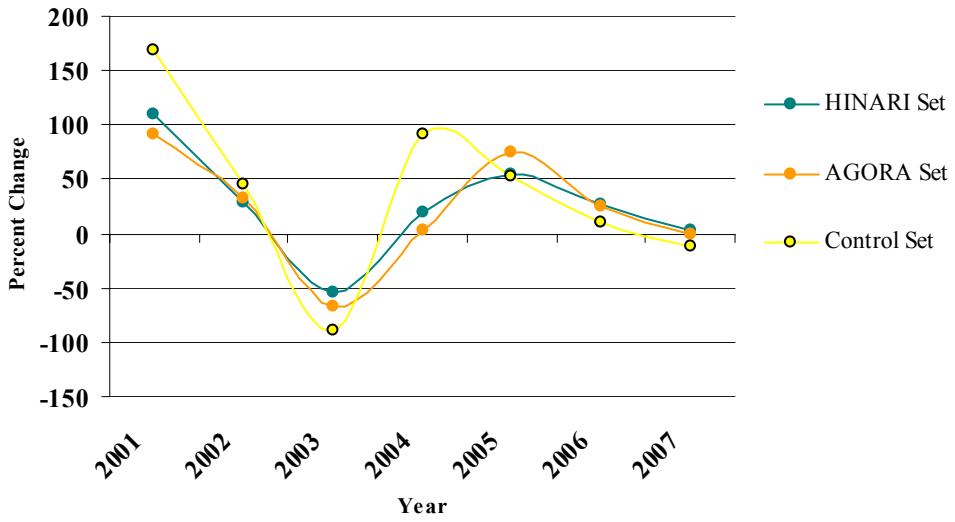


Figure C.68 Percent Change in Frequency of Citations Made by Namibia Researchers

Table C.34 Average Percent Change in Frequency of Citations Made by Namibia Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-59.3805	-11.3107	6.4783	-15.5378

10.1.4.3 Swaziland

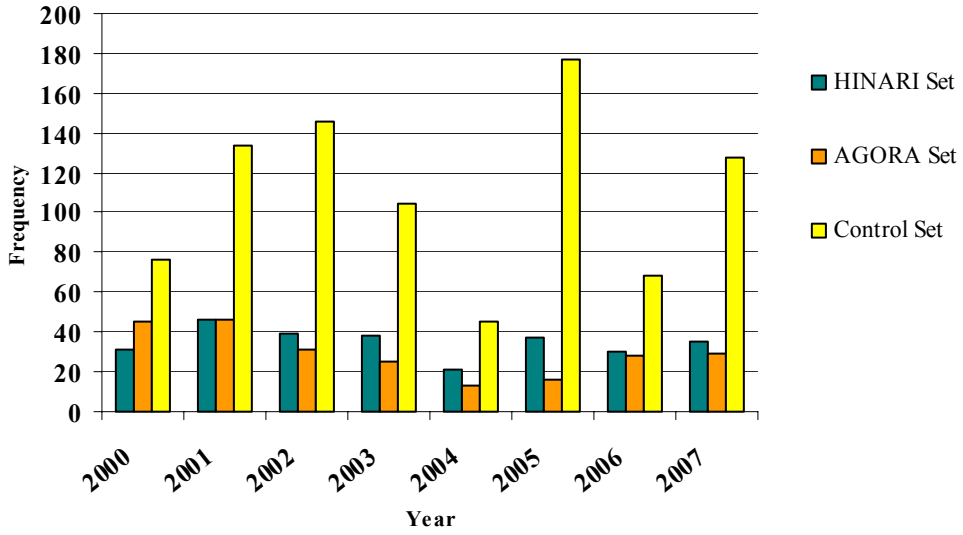


Figure C.69 Frequency of Citations Made by Swaziland Researchers

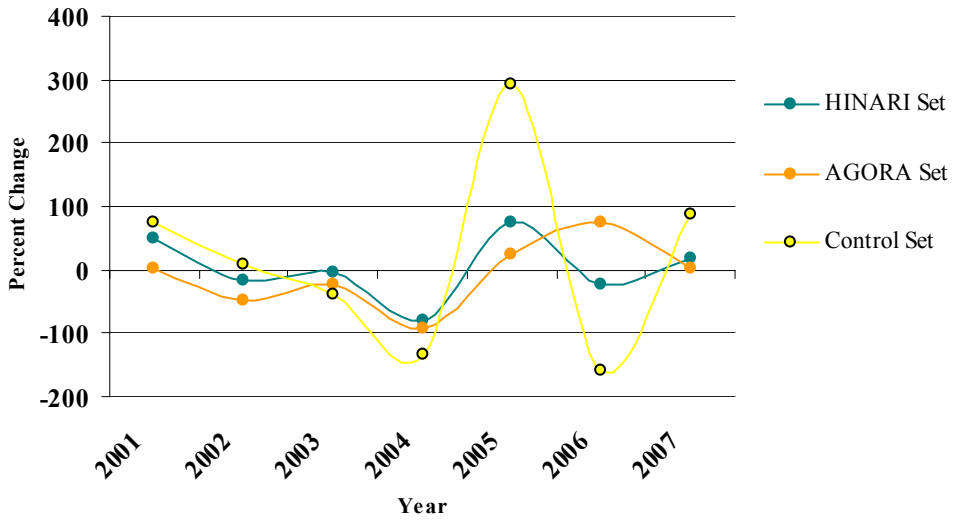


Figure C.70 Percent Change in Frequency of Citations Made by Swaziland Researchers

Table C.35 Average Percent Change in Frequency of Citations Made by Swaziland Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-18.0312	-16.8266	25.7235	-27.8555

C.1.5 Western Africa

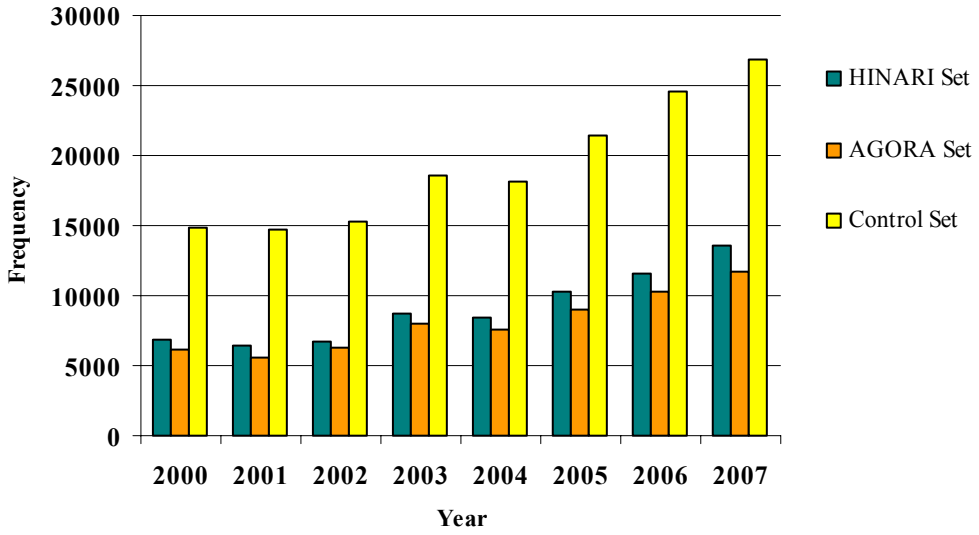


Figure C.71 Frequency of Citations Made by Eligible Western Africa Researchers

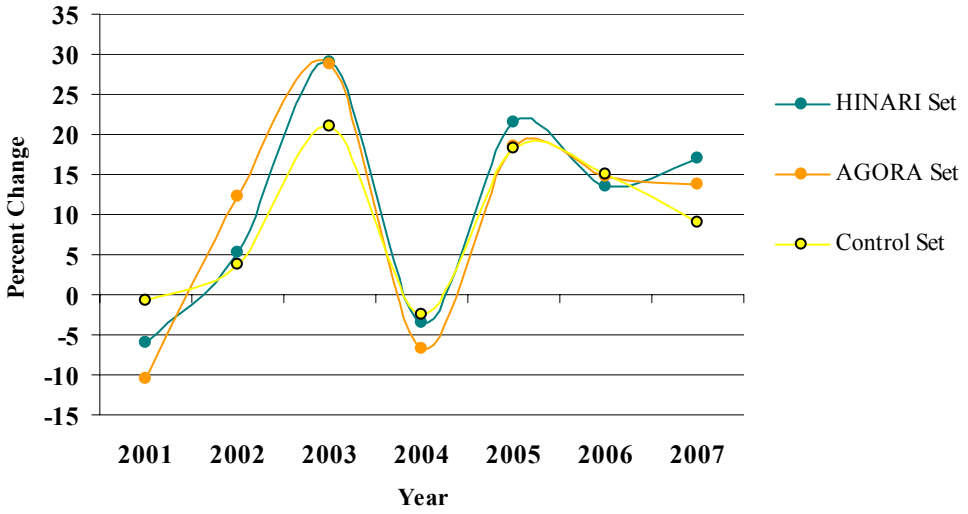


Figure C.72 Percent Change in Frequency of Citations Made by Eligible Western Africa Researchers

Table C.36 Average Percent Change in Frequency of Citations Made by Eligible Western Africa Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
15.9732	1.8351	-0.0598	1.0434

C.1.5.1 Benin

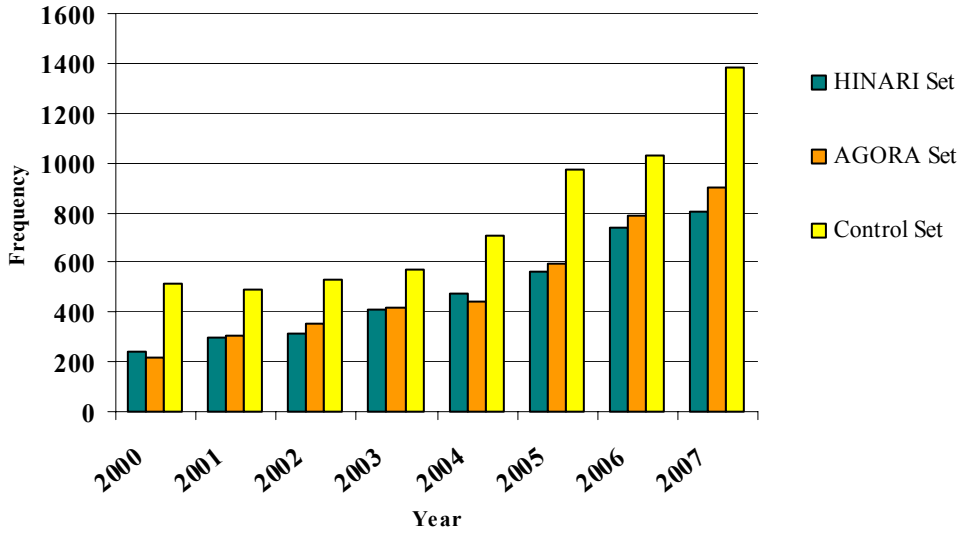


Figure C.73 Frequency of Citations Made by Benin Researchers

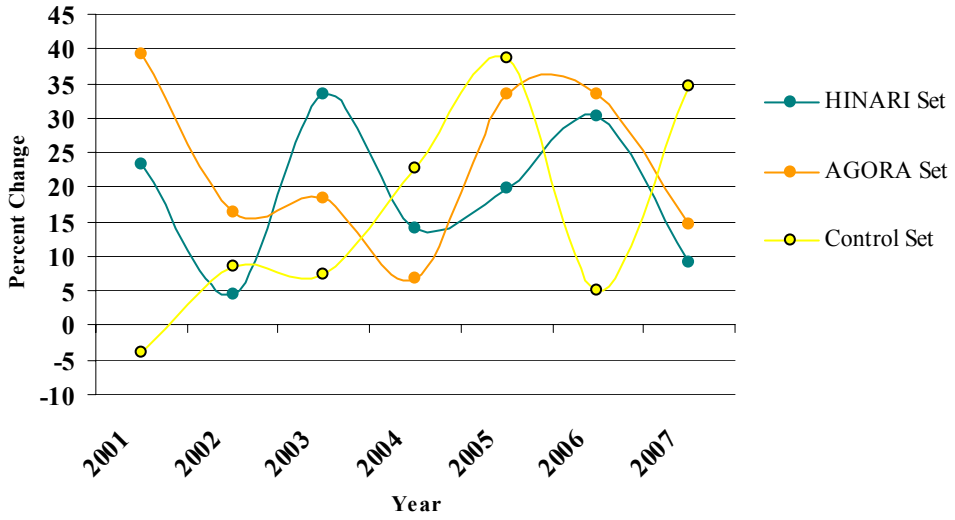


Figure C.74 Percent Change in Frequency of Citations Made by Benin Researchers

Table C.37 Average Percent Change in Frequency of Citations Made by Benin Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
7.5464	3.0585	-2.4847	6.9847

C.1.5.2 Burkina Faso

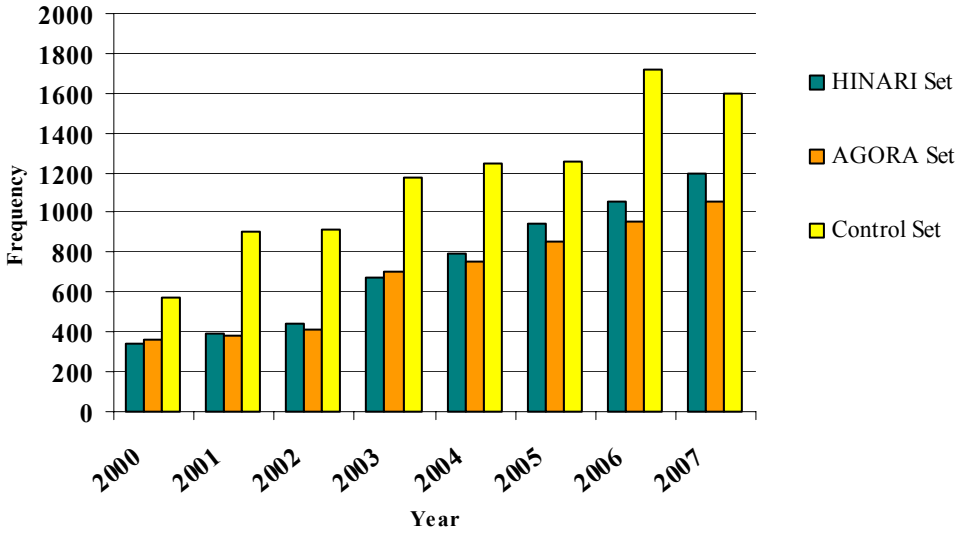


Figure C.75 Frequency of Citations Made by Burkina Faso Researchers

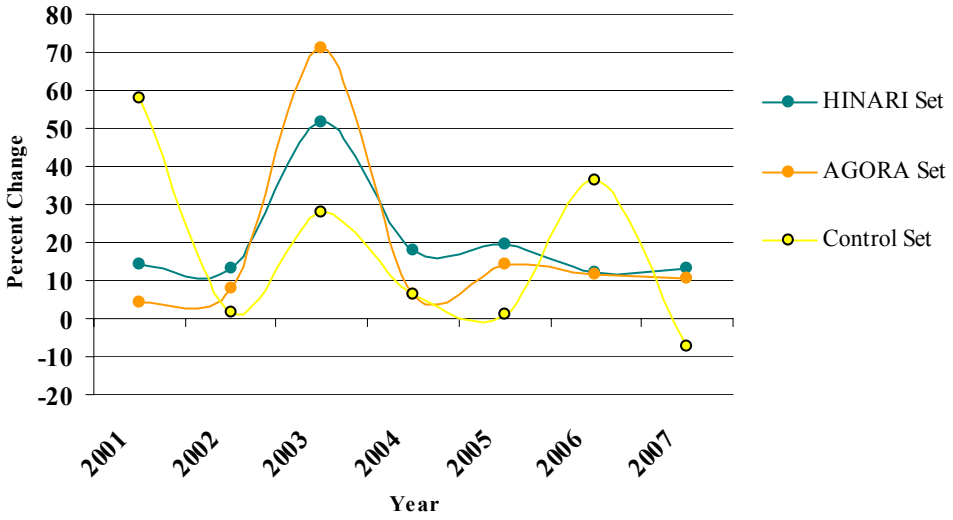


Figure C.76 Percent Change in Frequency of Citations Made by Burkina Faso Researchers

Table C.38 Average Percent Change in Frequency of Citations Made by Burkina Faso Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
9.0072	2.5227	-17.2633	0.2897

C.1.5.3 Cape Verde

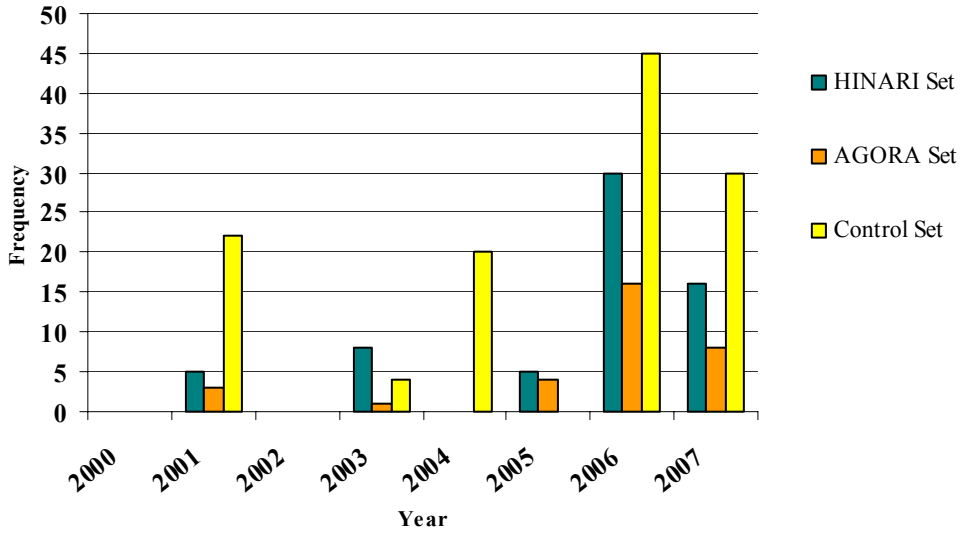


Figure C.77 Frequency of Citations Made by Cape Verde Researchers

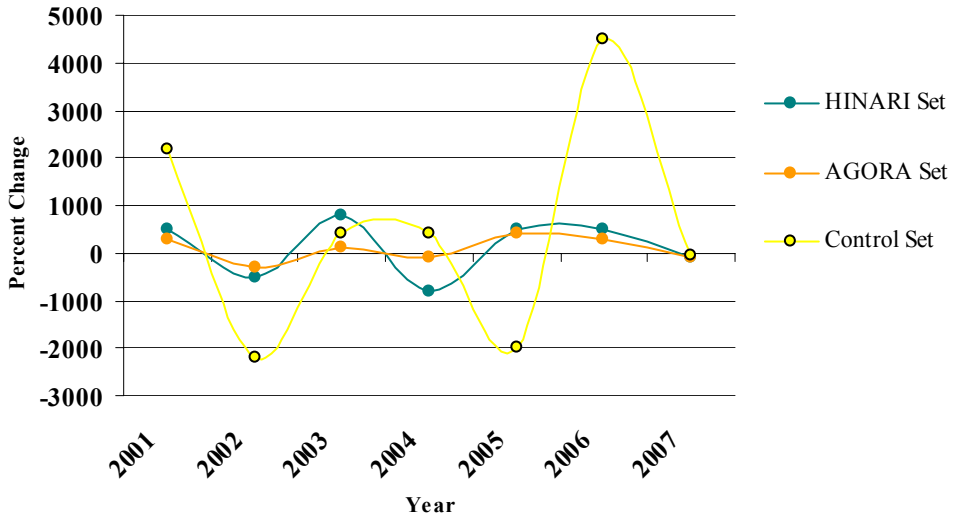


Figure C.78 Percent Change in Frequency of Citations Made by Cape Verde Researchers

Table C.39 Average Percent Change in Frequency of Citations Made by Cape Verde Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
182.5000	-333.9286	91.6667	-378.5714

C.1.5.4 Cote Ivoire

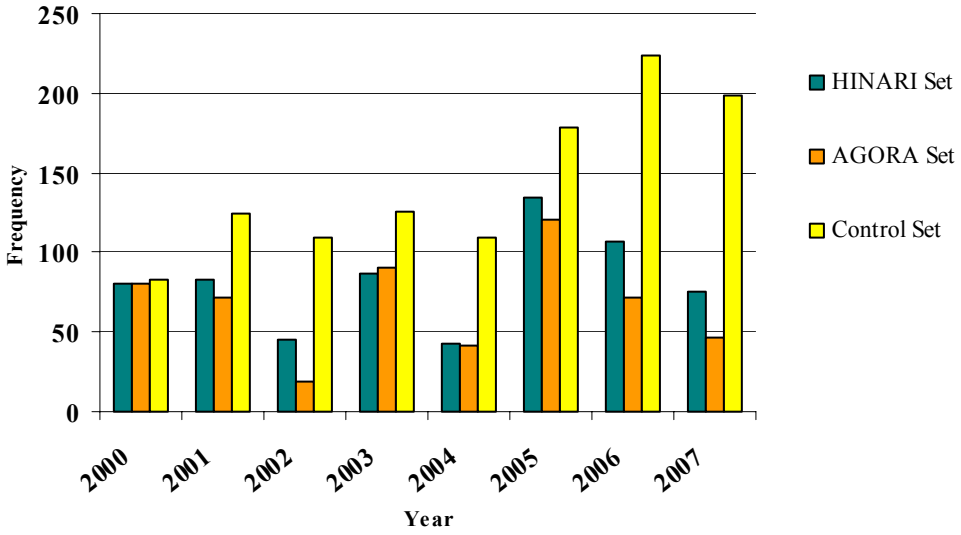


Figure C.79 Frequency of Citations Made by Cote Ivoire Researchers

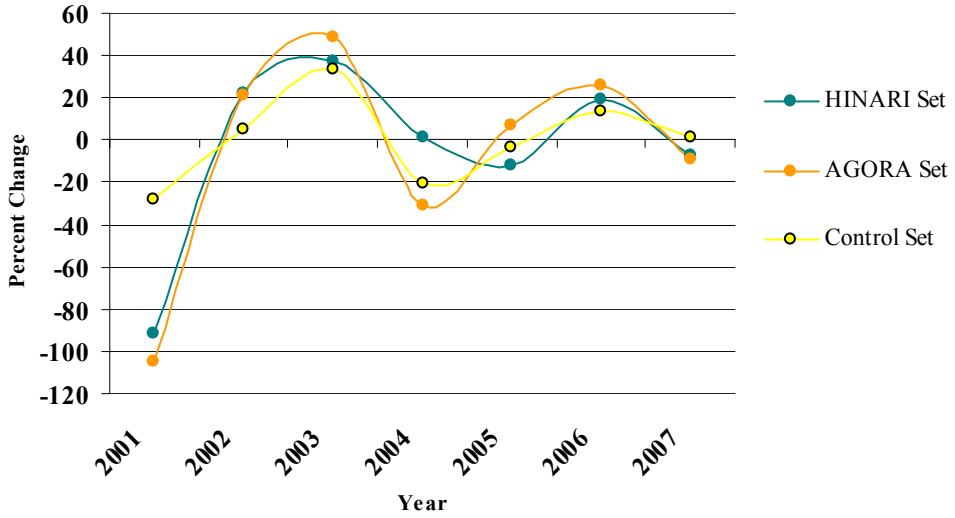


Figure C.80 Percent Change in Frequency of Citations Made by Cote Ivoire Researchers

Table C.40 Average Percent Change in Frequency of Citations Made by Cote Ivoire Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
41.9196	-4.7293	9.6146	-6.3416

C.1.5.5 Gambia

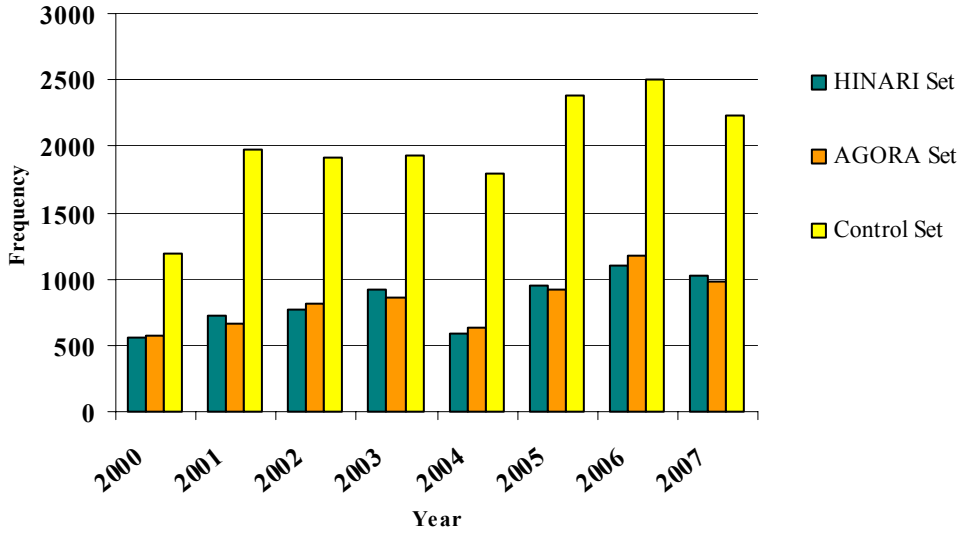


Figure C.81 Frequency of Citations Made by Gambia Researchers

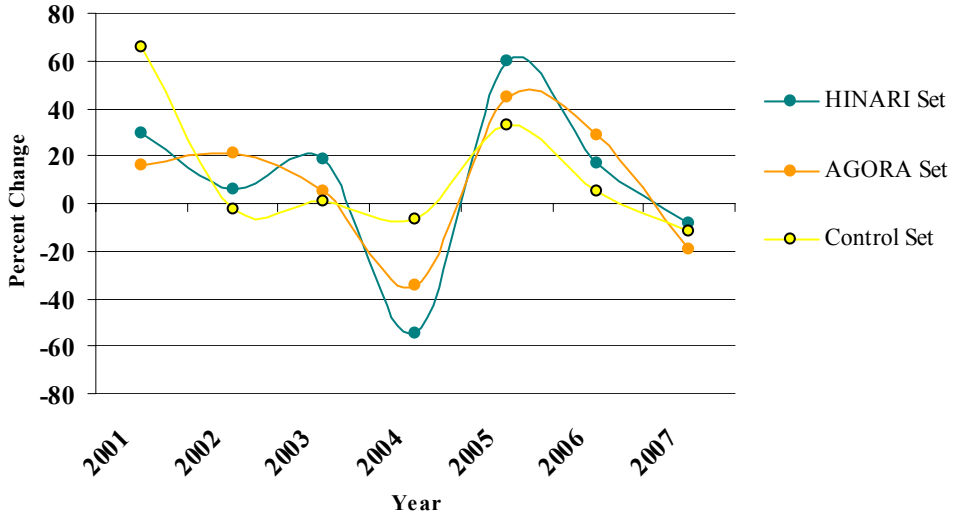


Figure C.82 Percent Change in Frequency of Citations Made by Gambia Researchers

Table C.41 Average Percent Change in Frequency of Citations Made by Gambia Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-11.4370	-1.9984	-9.4595	-2.7930

C.1.5.6 Ghana

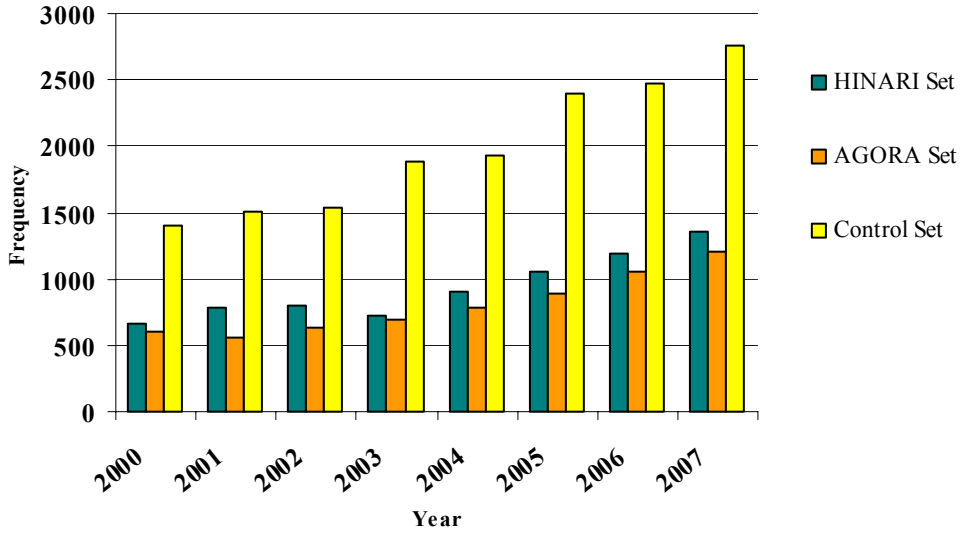


Figure C.83 Frequency of Citations Made by Ghana Researchers

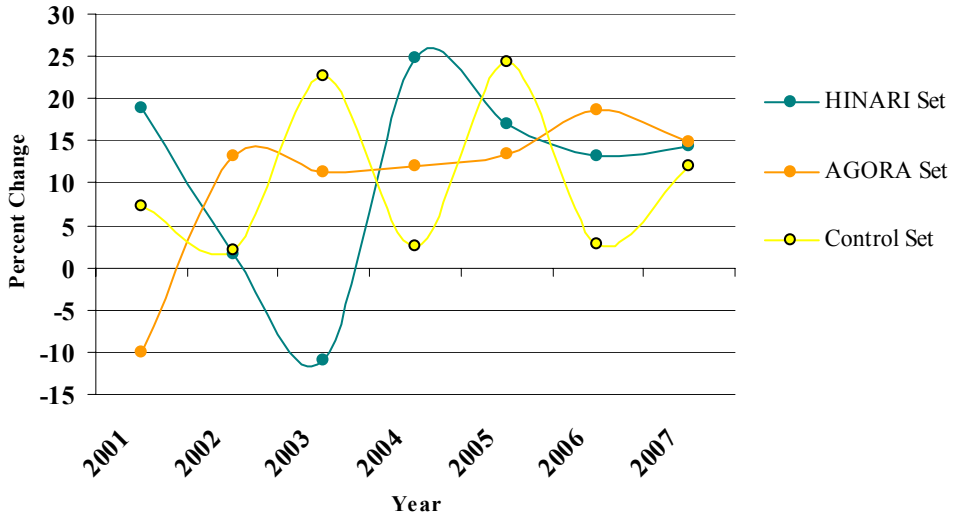


Figure C.84 Percent Change in Frequency of Citations Made by Ghana Researchers

Table C.42 Average Percent Change in Frequency of Citations Made by Ghana Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
1.4756	0.7219	9.7957	-0.0804

C.1.5.7 Guinea

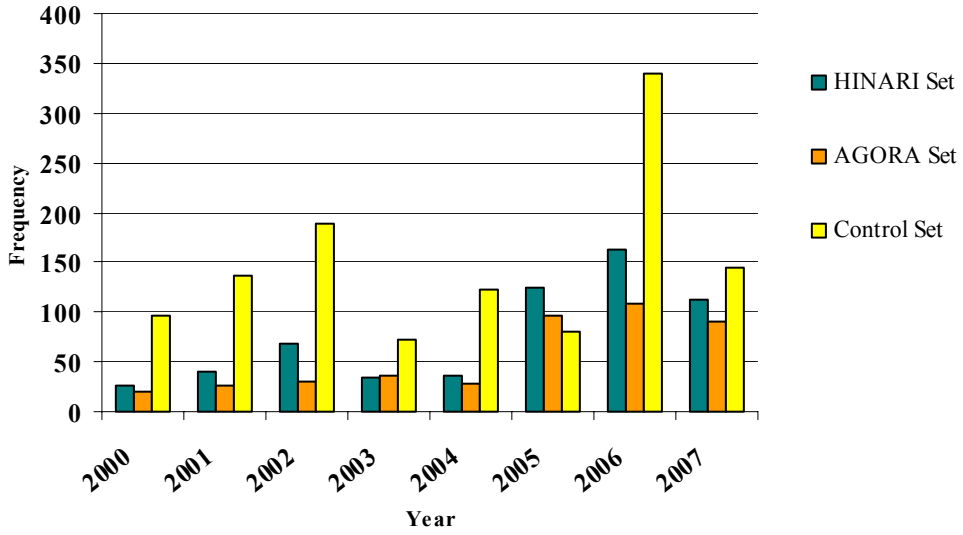


Figure C.85 Frequency of Citations Made by Guinea Researchers

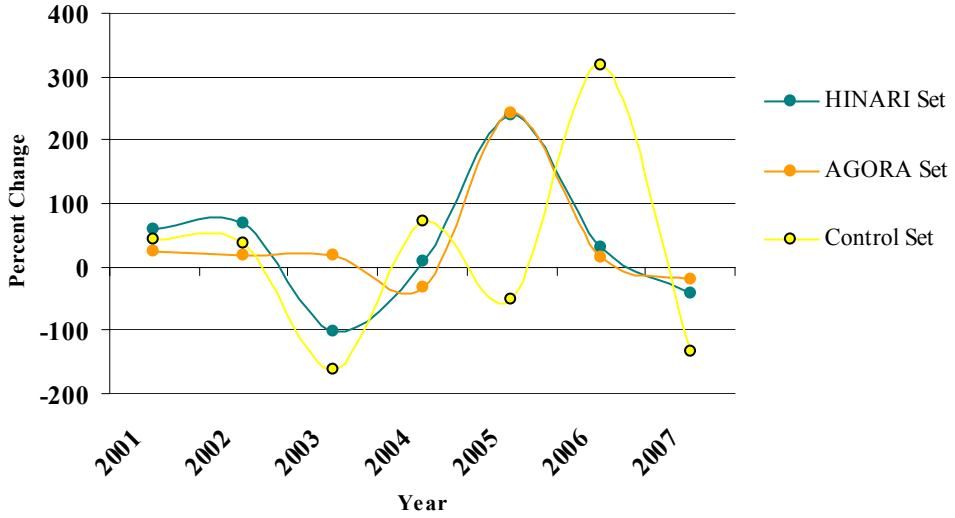


Figure C.86 Percent Change in Frequency of Citations Made by Guinea Researchers

Table C.43 Average Percent Change in Frequency of Citations Made by Guinea Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-37.0010	19.0635	29.9878	20.4346

C.1.5.8 Guinea-Bissau

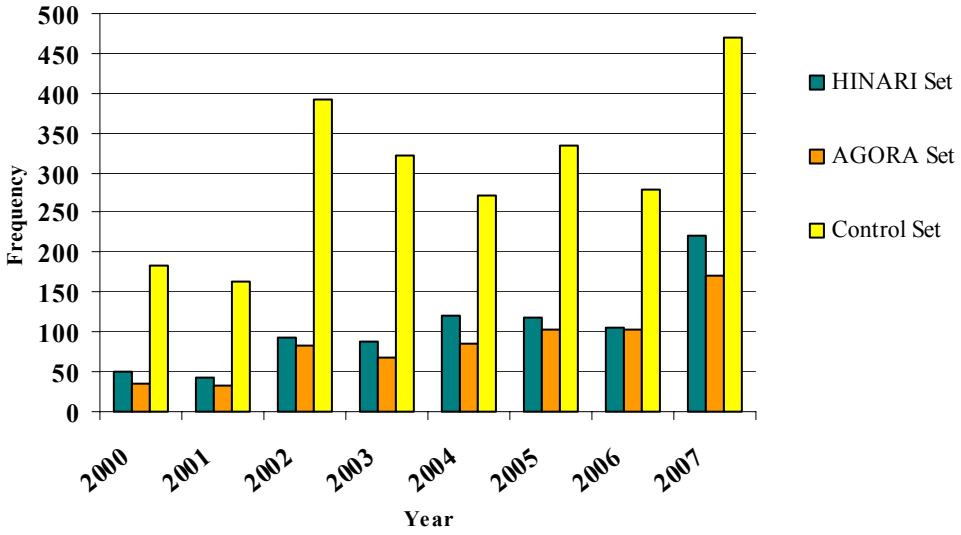


Figure C.87 Frequency of Citations Made by Guinea-Bissau Researchers

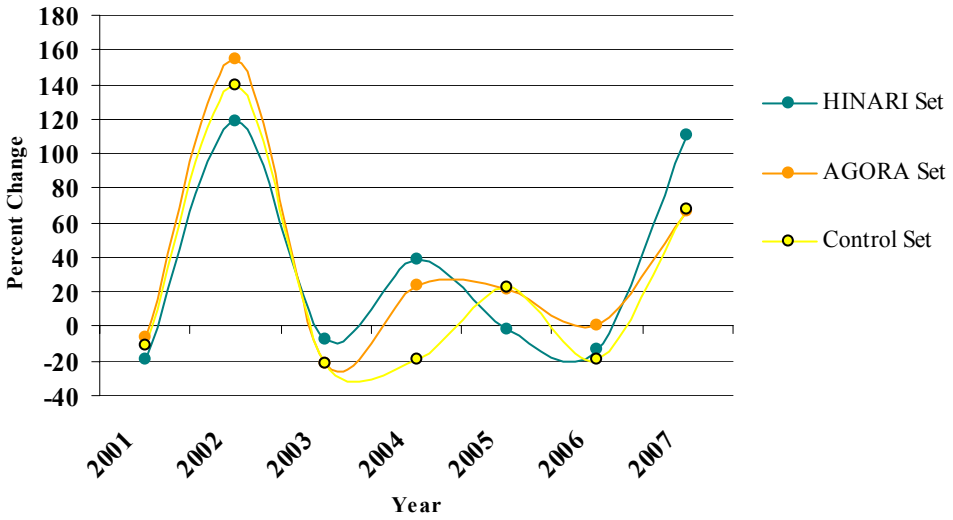


Figure C.88 Percent Change in Frequency of Citations Made by Guinea-Bissau Researchers

Table C.44 Average Percent Change in Frequency of Citations Made by Guinea-Bissau Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-24.7007	9.6953	-14.6525	11.2144

C.1.5.9 Liberia

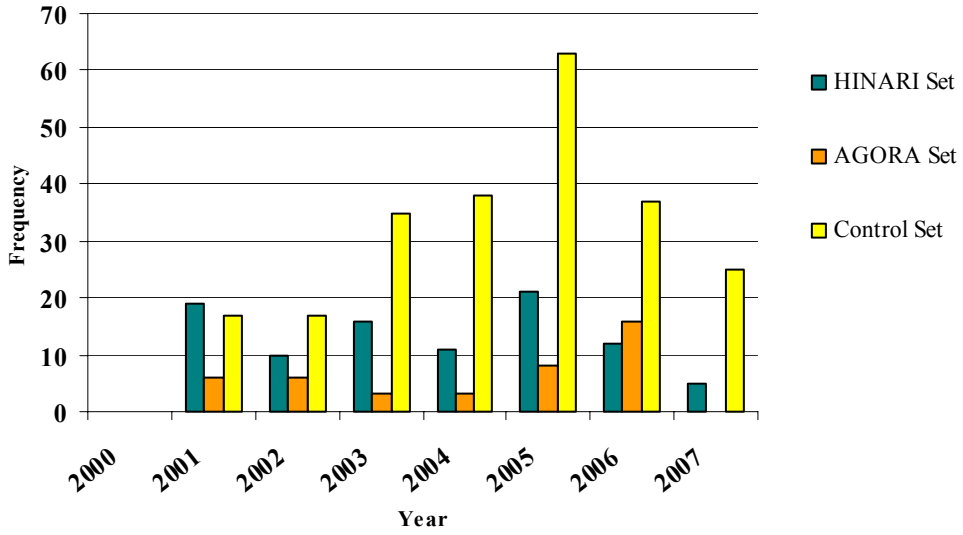


Figure C.89 Frequency of Citations Made by Liberia Researchers

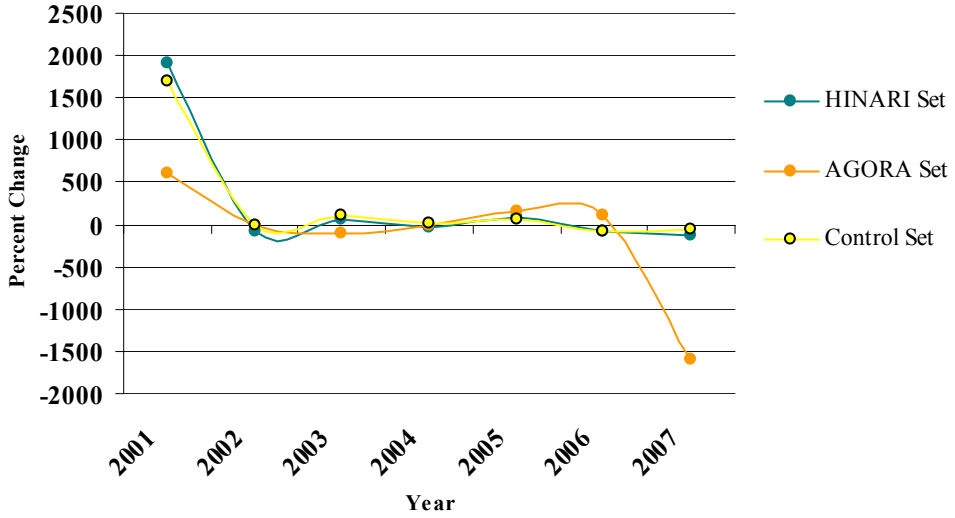


Figure C.90 Percent Change in Frequency of Citations Made by Liberia Researchers

Table C.45 Average Percent Change in Frequency of Citations Made by Liberia Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-926.9091	-8.7883	-500.0000	-370.7580

C.1.5.10 Mali

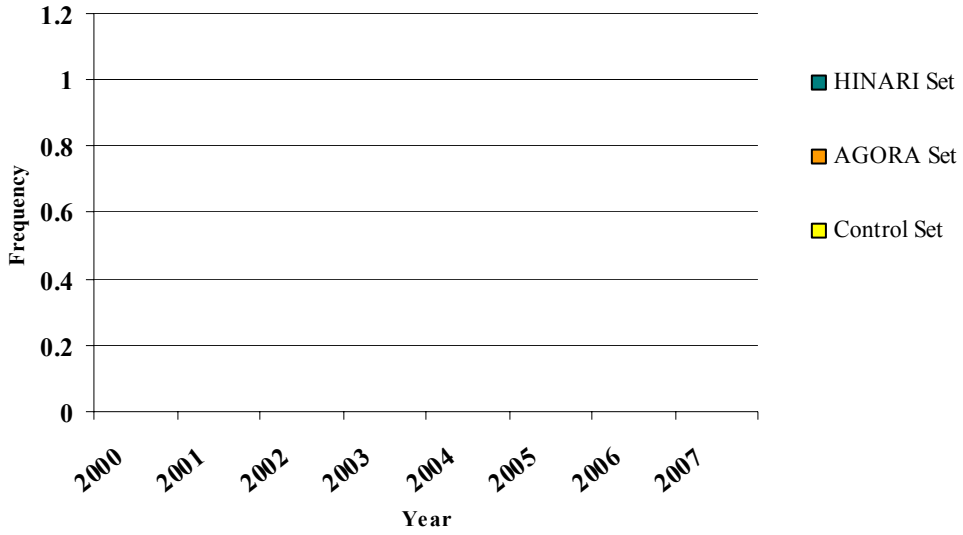


Figure C.91 Frequency of Citations Made by Mali Researchers

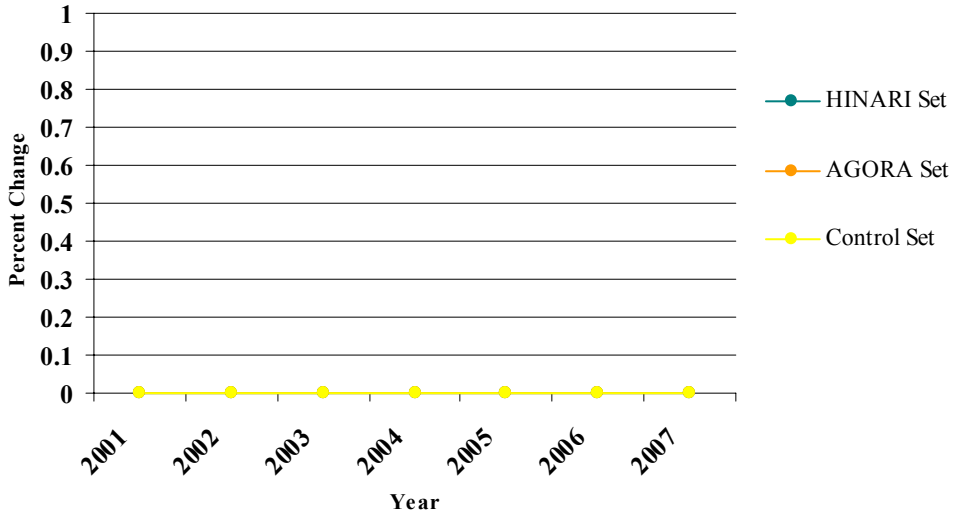


Figure C.92 Percent Change in Frequency of Citations Made by Mali Researchers

Table C.46 Average Percent Change in Frequency of Citations Made by Mali Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
0.0000	0.0000	0.0000	0.0000

C.1.5.11 Mauritania

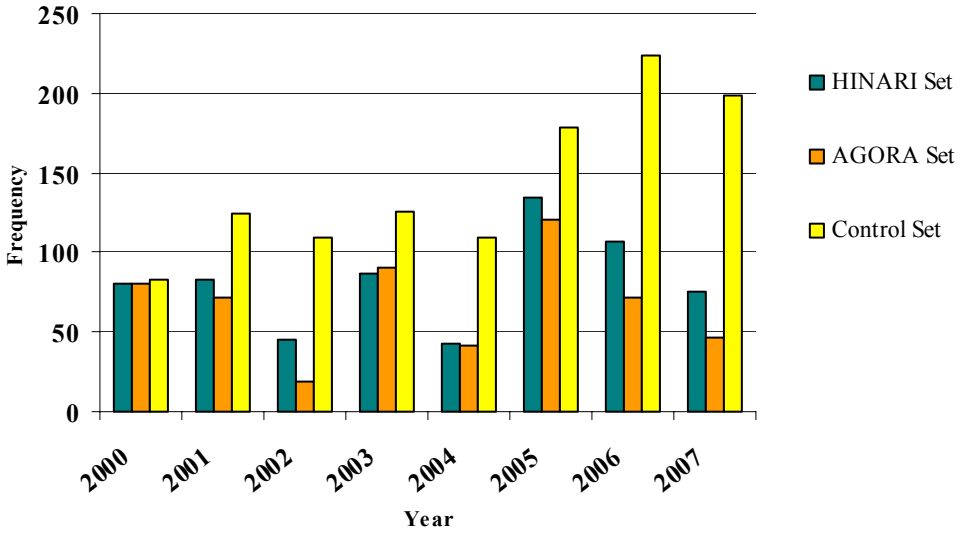


Figure C.93 Frequency of Citations Made by Mauritania Researchers

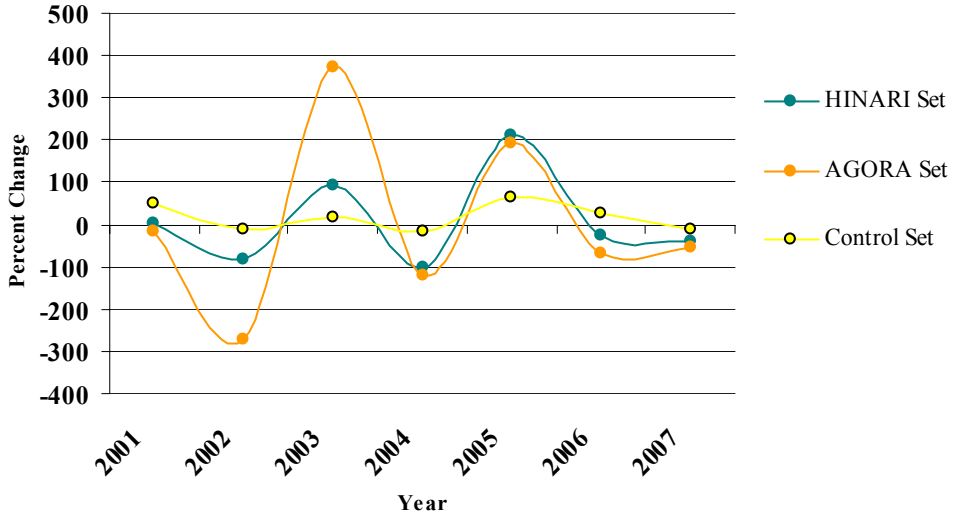


Figure C.94 Percent Change in Frequency of Citations Made by Mauritania Researchers

Table C.47 Average Percent Change in Frequency of Citations Made by Mauritania Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
67.6697	-7.9536	-41.1429	-10.8137

C.1.5.12 Niger

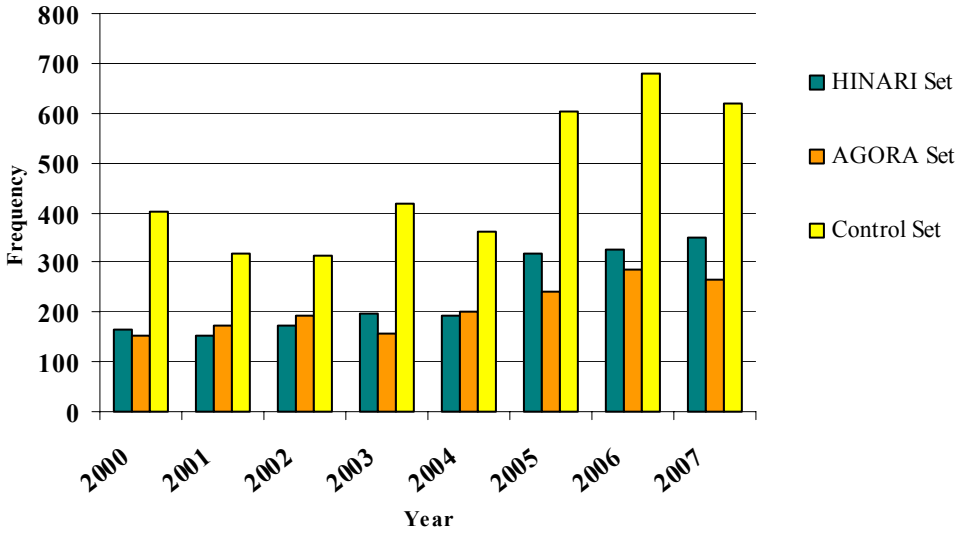


Figure C.95 Frequency of Citations Made by Niger Researchers

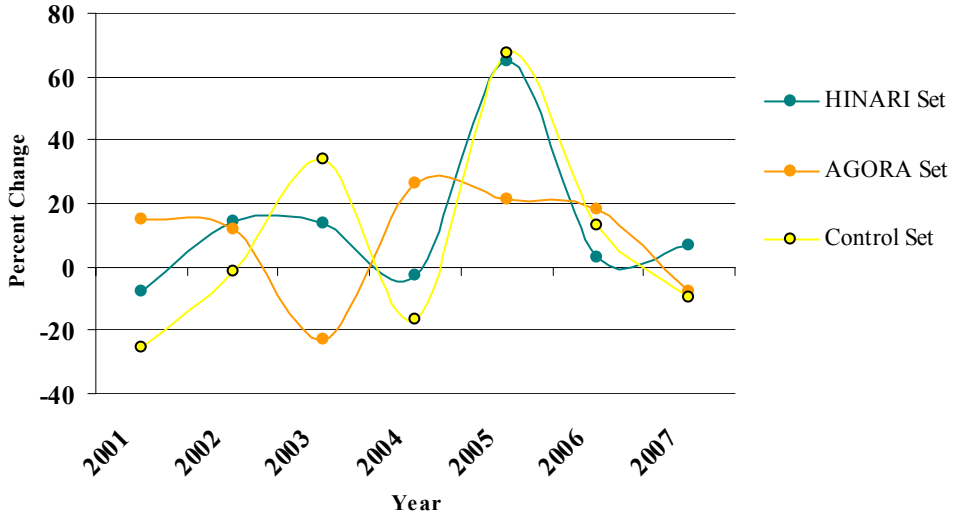


Figure C.96 Percent Change in Frequency of Citations Made by Niger Researchers

Table C.48 Average Percent Change in Frequency of Citations Made by Niger Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
13.8417	4.5594	13.1461	0.1870

C.1.5.13 Nigeria

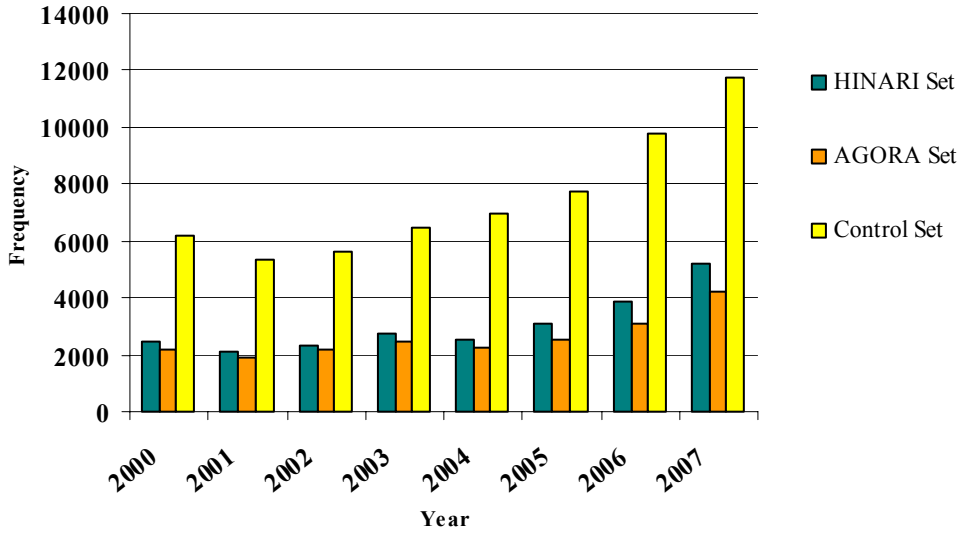


Figure C.97 Frequency of Citations Made by Nigeria Researchers

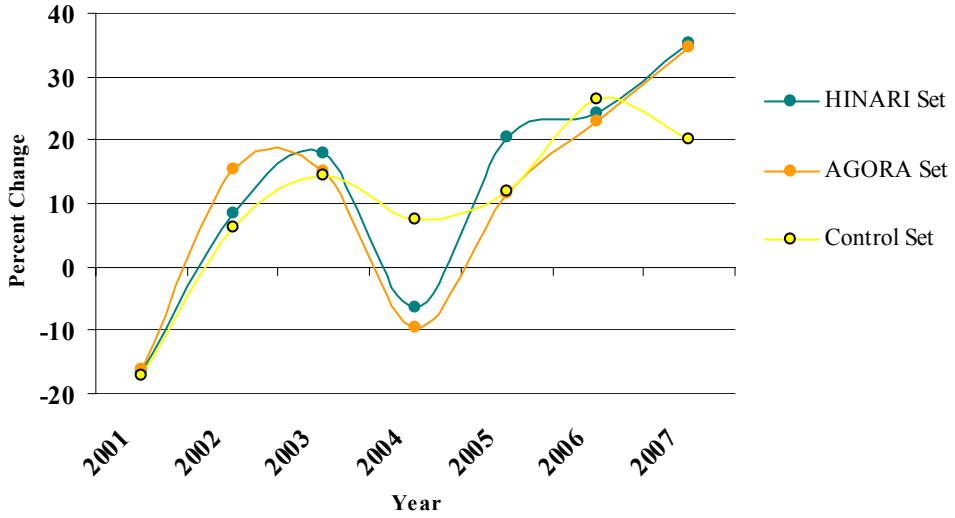


Figure C.98 Percent Change in Frequency of Citations Made by Nigeria Researchers

Table C.49 Average Percent Change in Frequency of Citations Made by Nigeria Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
22.3296	1.9693	10.1269	0.6084

C.1.5.14 Senegal

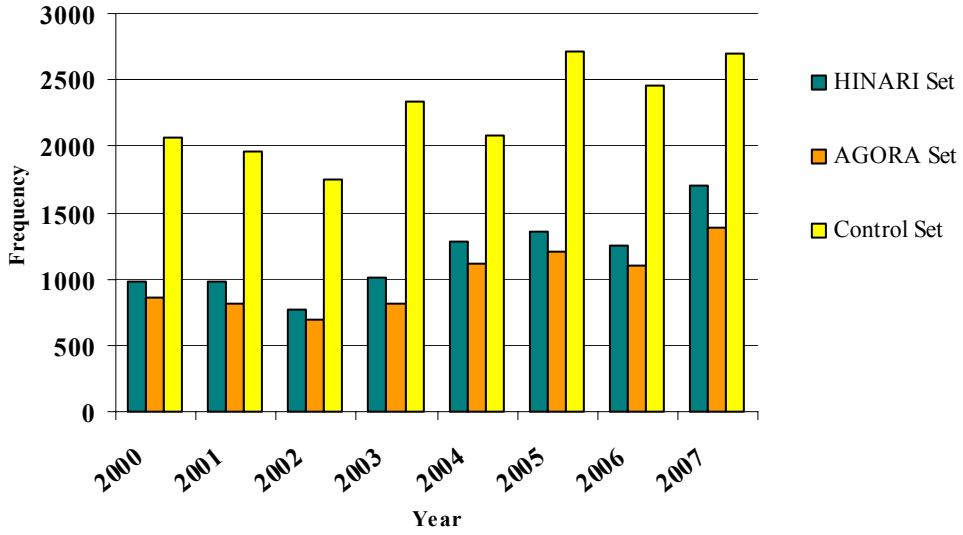


Figure C.99 Frequency of Citations Made by Senegal Researchers

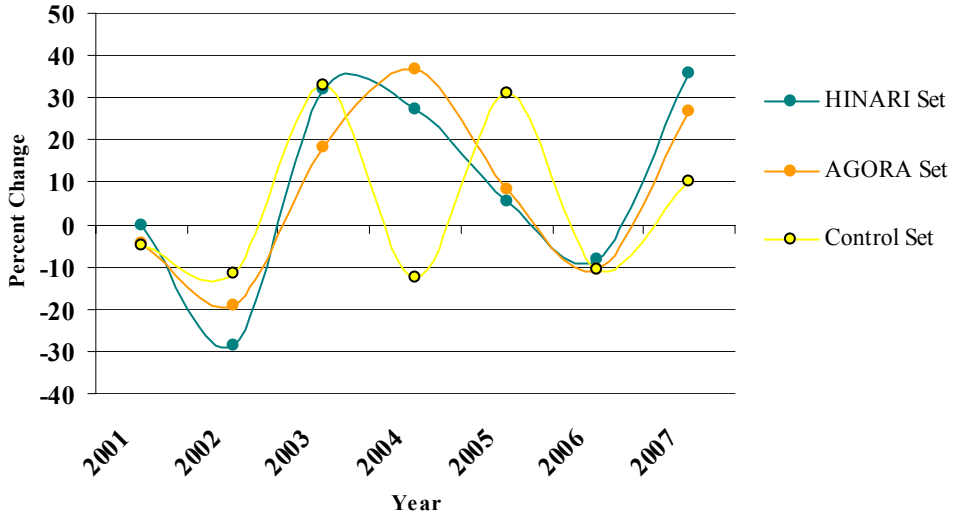


Figure C.100 Percent Change in Frequency of Citations Made by Senegal Researchers

Table C.50 Average Percent Change in Frequency of Citations Made by Senegal Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
32.7829	4.2571	17.0615	3.1908

C.1.5.15 Sierra Leone

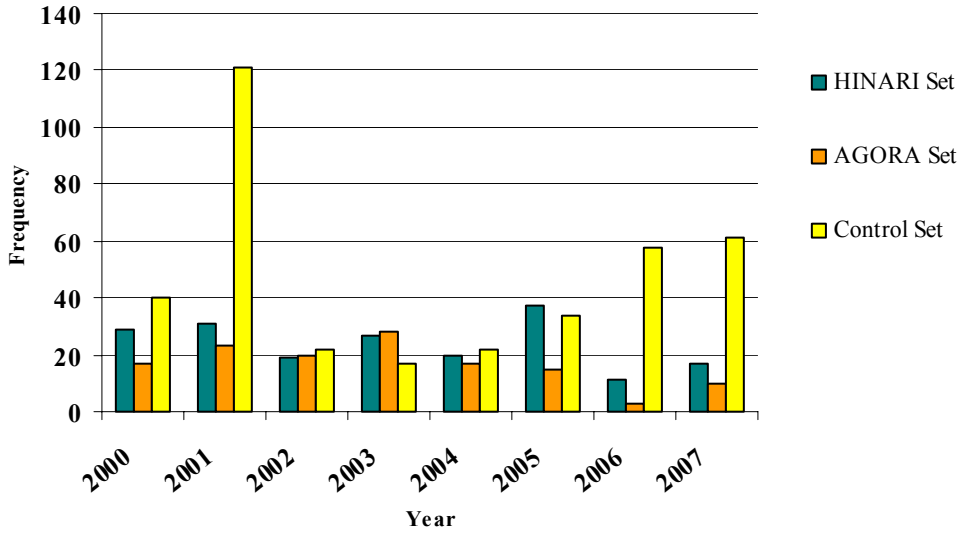


Figure C.101 Frequency of Citations Made by Sierra Leone Researchers

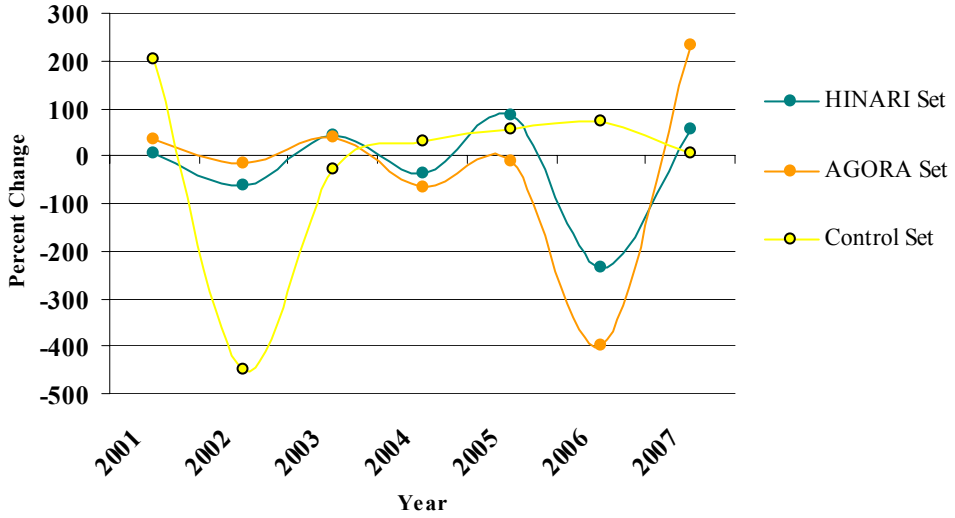


Figure C.102 Percent Change in Frequency of Citations Made by Sierra Leone Researchers

Table C.51 Average Percent Change in Frequency of Citations Made by Sierra Leone Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
10.1881	-4.1115	-81.2745	-9.6026

C.1.5.16 Togo

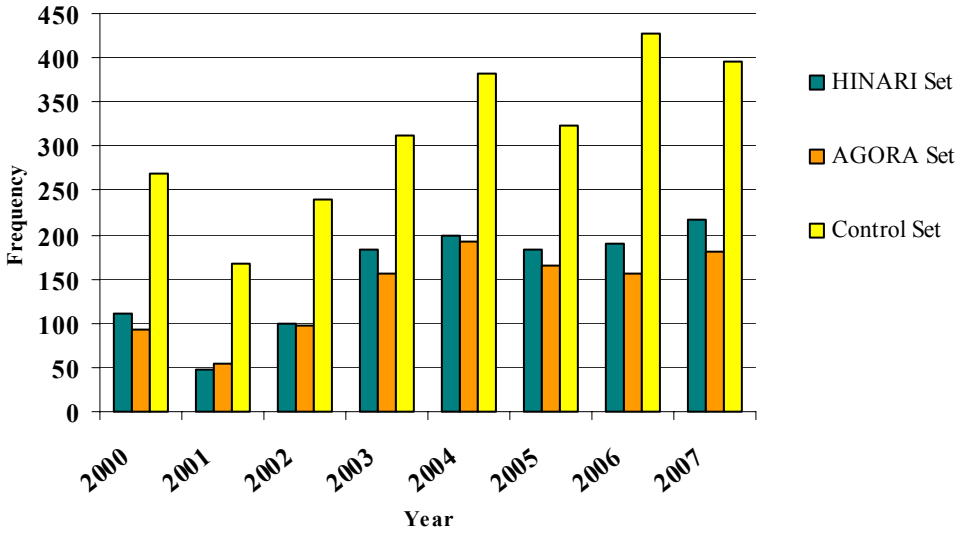


Figure C.103 Frequency of Citations Made by Togo Researchers

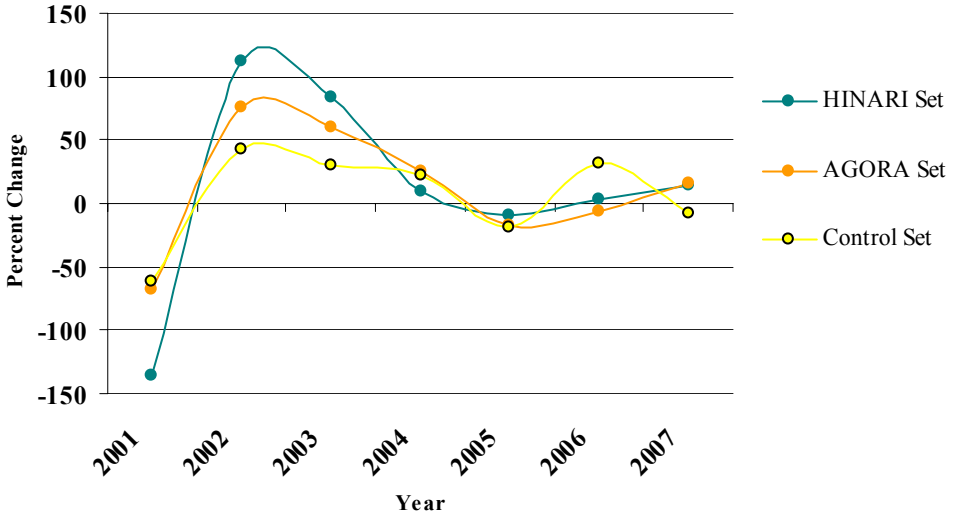


Figure C.104 Percent Change in Frequency of Citations Made by Togo Researchers

Table C.52 Average Percent Change in Frequency of Citations Made by Togo Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
31.9274	5.2274	-18.6711	6.4166

C.2 America

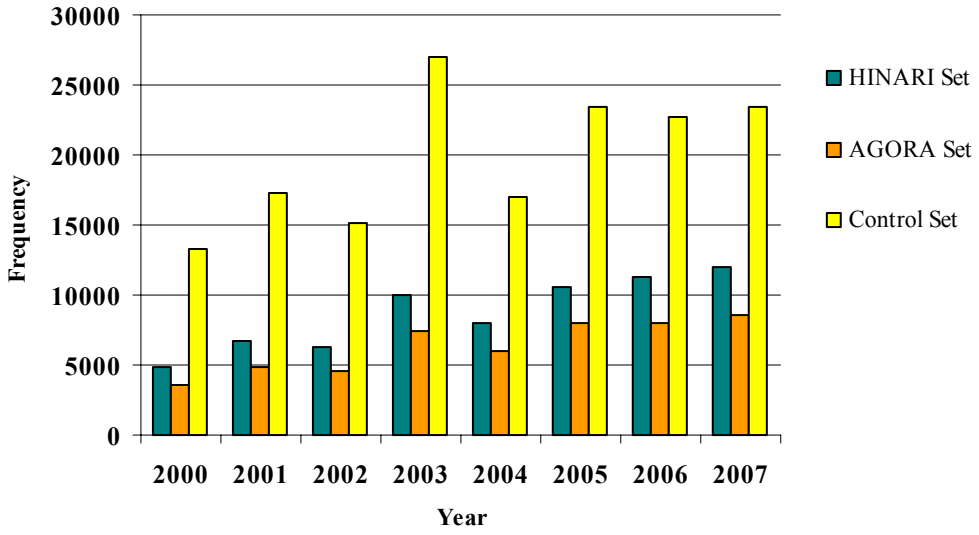


Figure C.105 Frequency of Citations Made by Eligible American Researchers

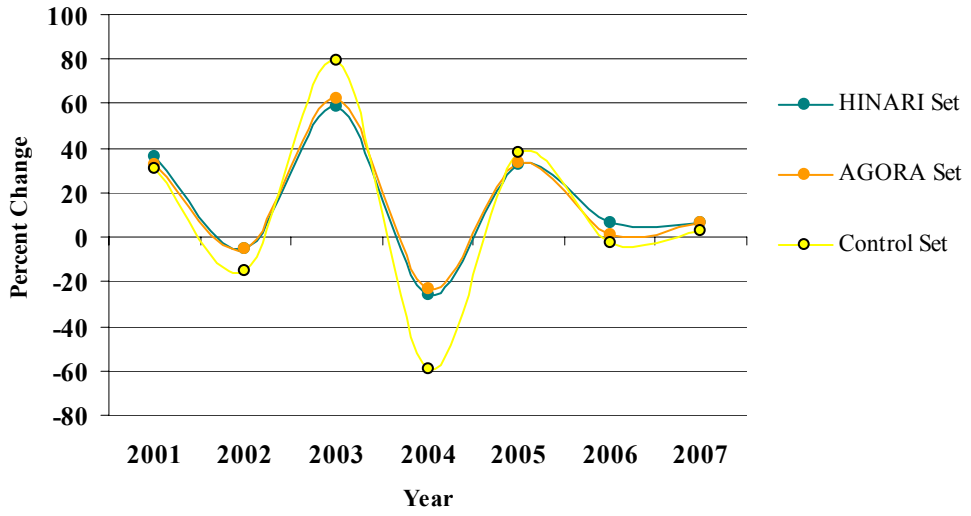


Figure C.106 Percent Change in Frequency of Citations Made by Eligible American Researchers

Table C.53 Average Percent Change in Frequency of Citations Made by Eligible American Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
0.0365	5.0565	-25.3223	4.6289

C.2.1 Caribbean

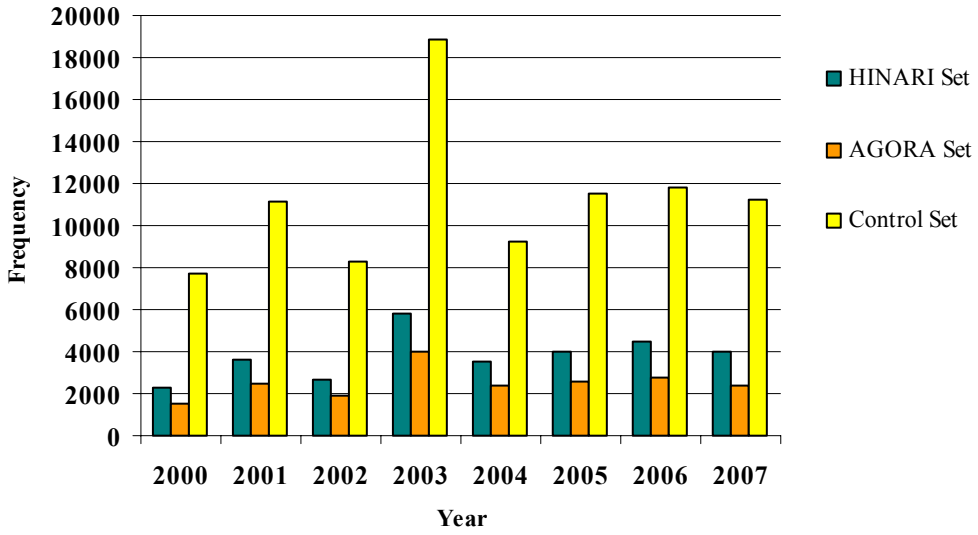


Figure C.107 Frequency of Citations Made by Eligible Caribbean Researchers

Figure C.108 Percent Change in Frequency of Citations Made by Eligible Caribbean Researchers

Table C.54 Average Percent Change in Frequency of Citations Made by Eligible Caribbean Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
2.5807	4.6520	-64.7886	3.3716

C.2.1.1 Cuba

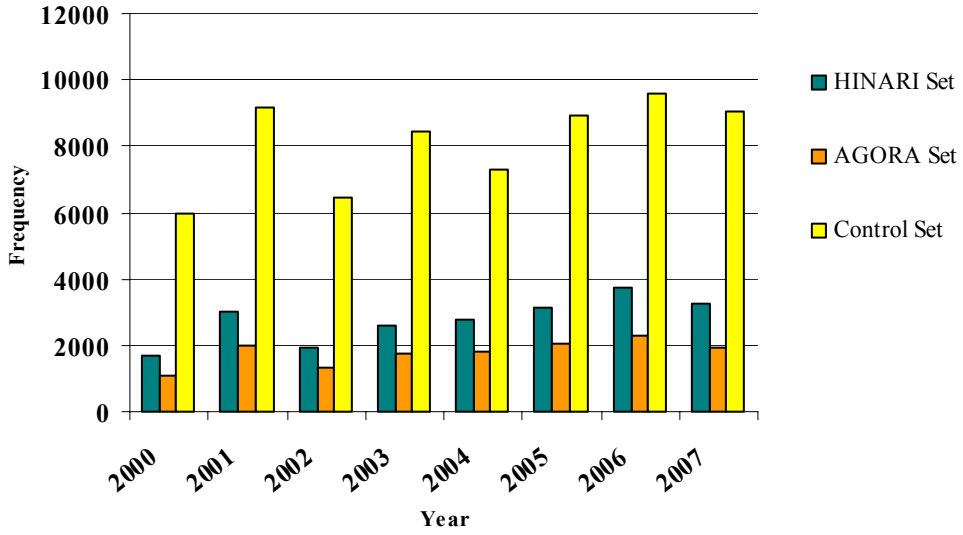


Figure C.109 Frequency of Citations Made by Cuba Researchers

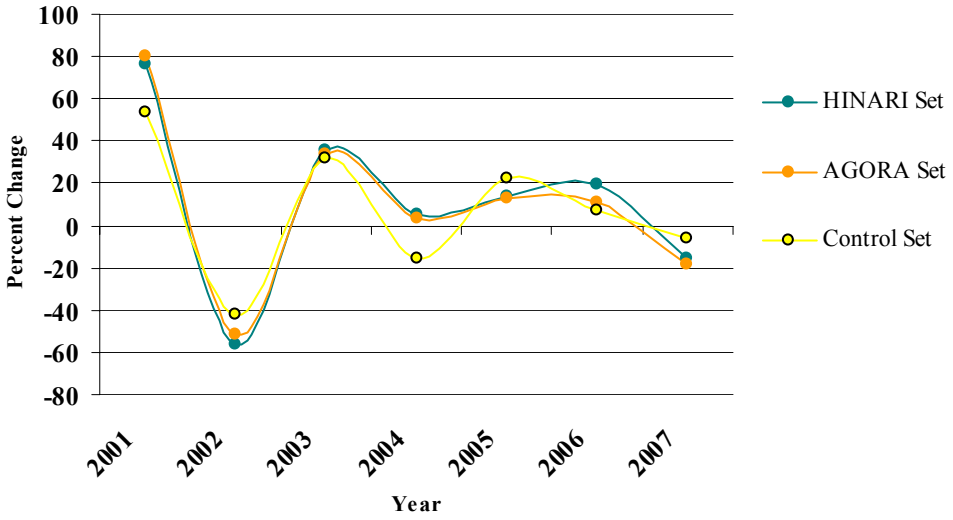


Figure C.110 Percent Change in Frequency of Citations Made by Cuba Researchers

Table C.55 Average Percent Change in Frequency of Citations Made by Cuba Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
1.9439	4.1236	-18.3259	3.0622

C.2.1.2 Dominican Republic

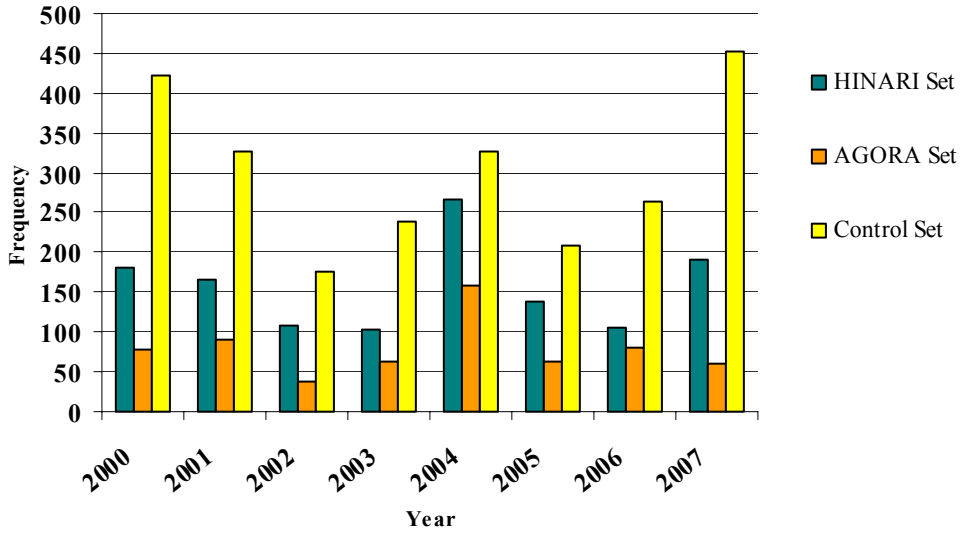


Figure C.111 Frequency of Citations Made by Dominican Republic Researchers

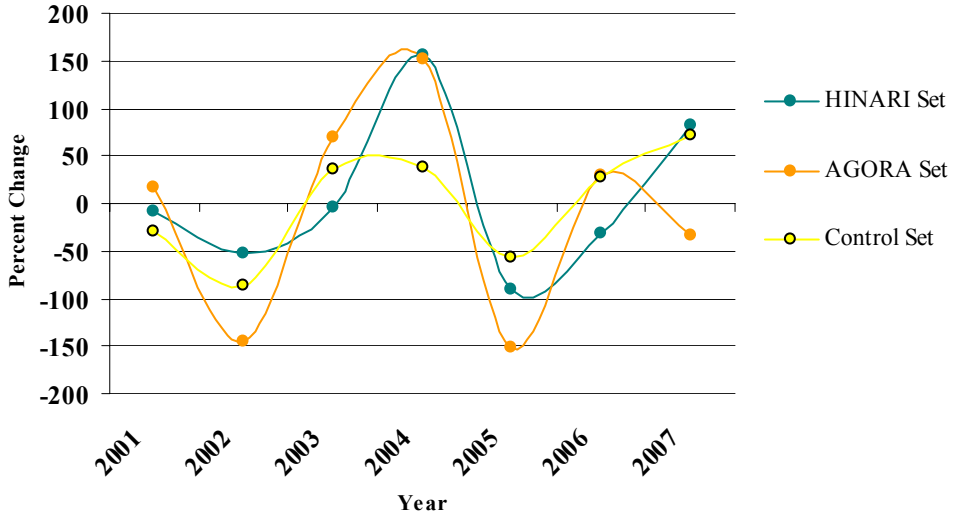


Figure C.112 Percent Change in Frequency of Citations Made by Dominican Republic Researchers

Table C.56 Average Percent Change in Frequency of Citations Made by Dominican Republic Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
53.1408	7.1806	18.6158	-8.8749

C.2.1.3 Haiti

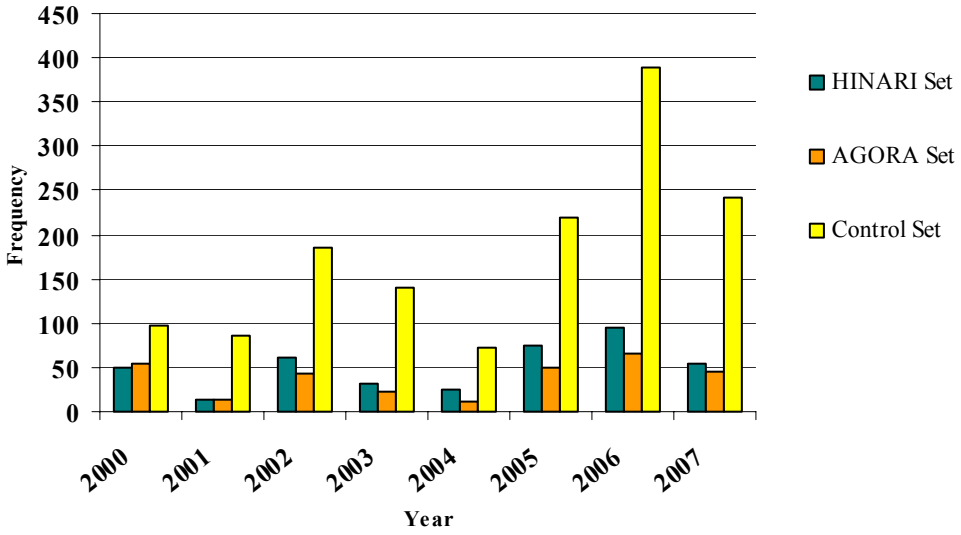


Figure C.113 Frequency of Citations Made by Haiti Researchers

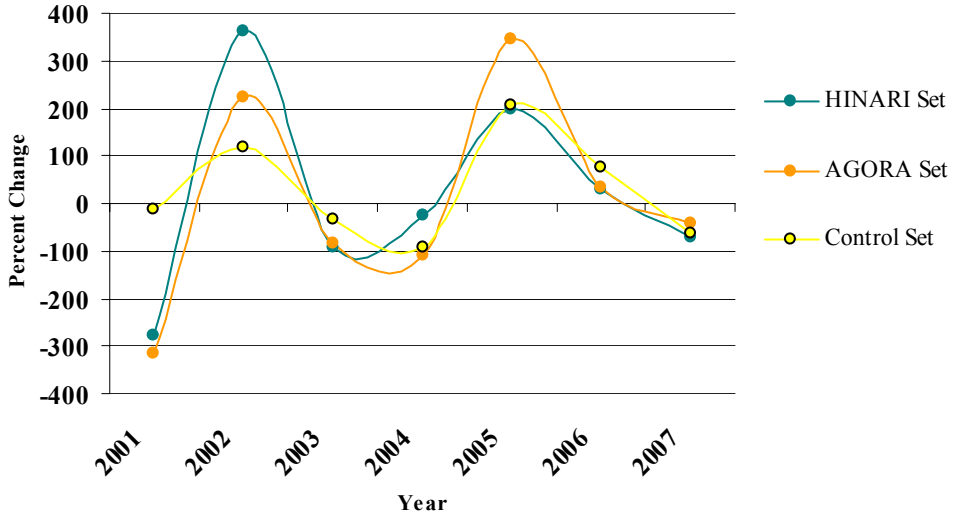


Figure C.114 Percent Change in Frequency of Citations Made by Haiti Researchers

Table C.57 Average Percent Change in Frequency of Citations Made by Haiti Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-35.4871	-11.3841	115.2336	-20.8016

C.2.1.4 Jamaica

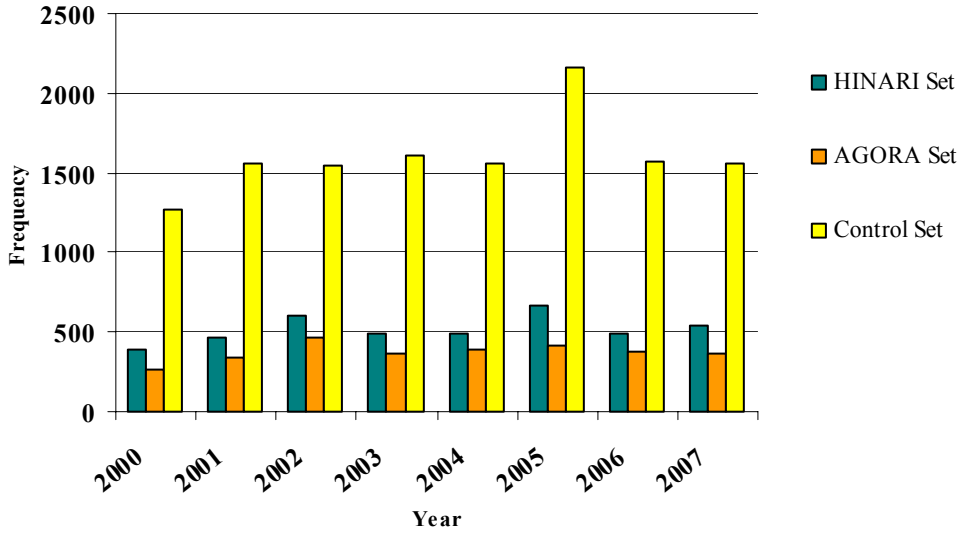


Figure C.115 Frequency of Citations Made by Jamaica Researchers

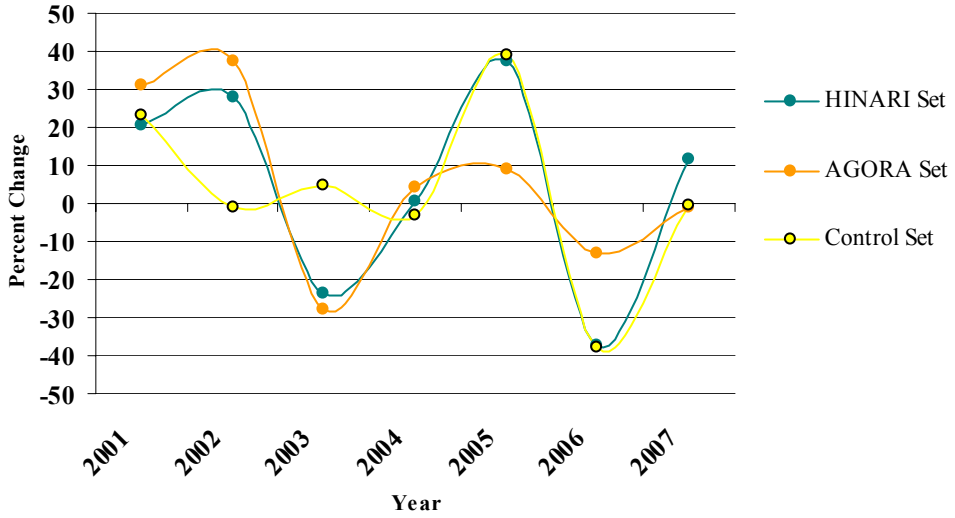


Figure C.116 Percent Change in Frequency of Citations Made by Jamaica Researchers

Table C.58 Average Percent Change in Frequency of Citations Made by Jamaica Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-26.3407	1.9343	-13.6028	2.4634

C.2.2 Central America

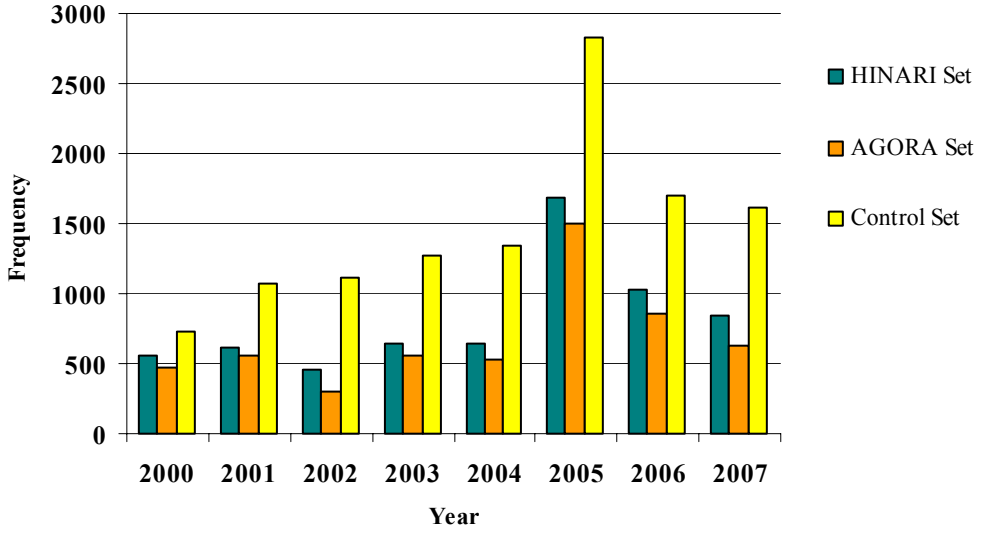


Figure C.117 Frequency of Citations Made by Eligible Central American Researchers

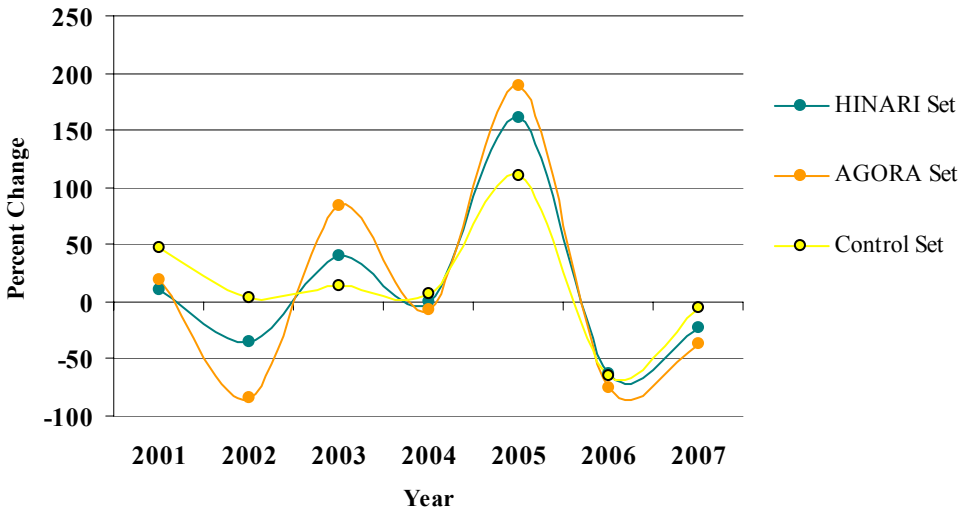


Figure C.118 Percent Change in Frequency of Citations Made by Eligible Central American Researchers

Table C.59 Average Percent Change in Frequency of Citations Made by Eligible Central American Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
35.2417	-2.4768	10.8984	-3.2200

C.2.2.1 El Salvador

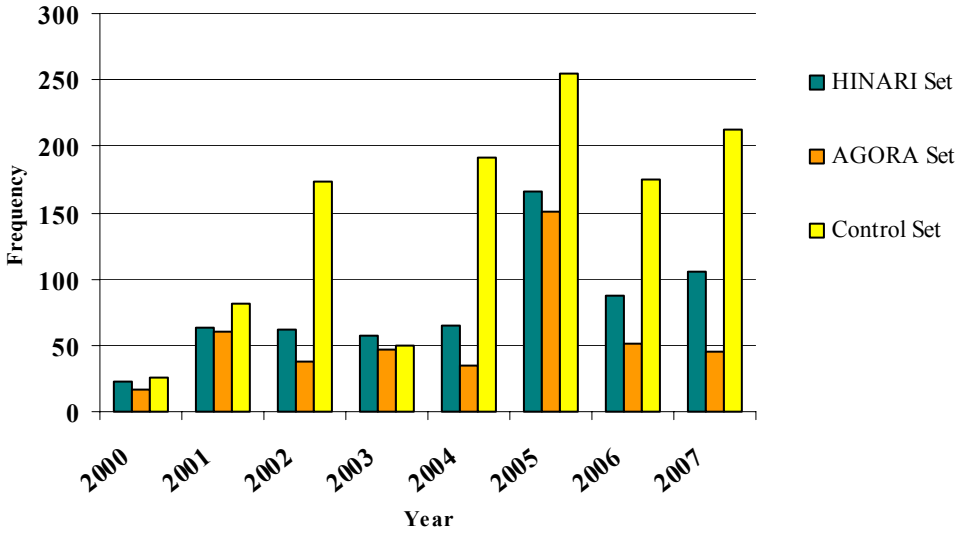


Figure C.119 Frequency of Citations Made by El Salvador Researchers

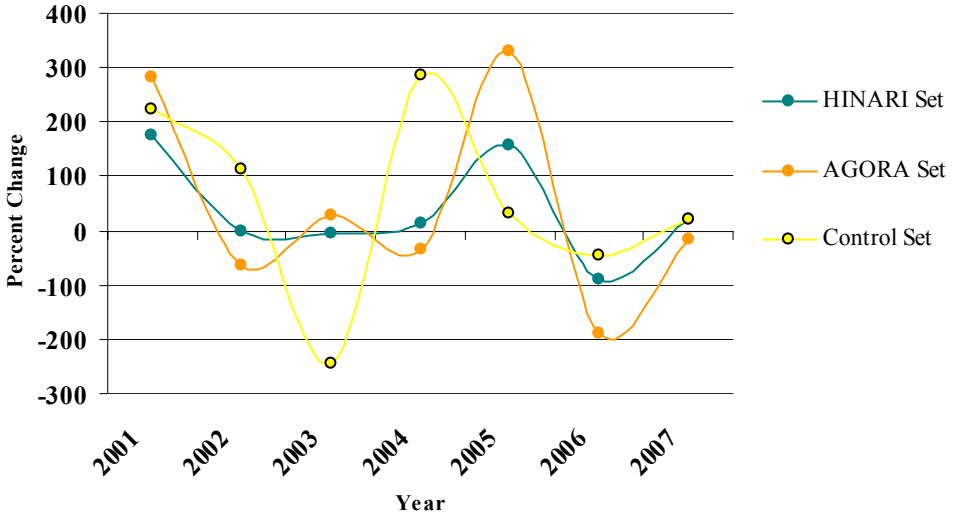


Figure C.120 Percent Change in Frequency of Citations Made by El Salvador Researchers

Table C.60 Average Percent Change in Frequency of Citations Made by El Salvador Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-67.8318	-17.2144	-58.3367	-7.1111

C.2.2.2 Guatemala

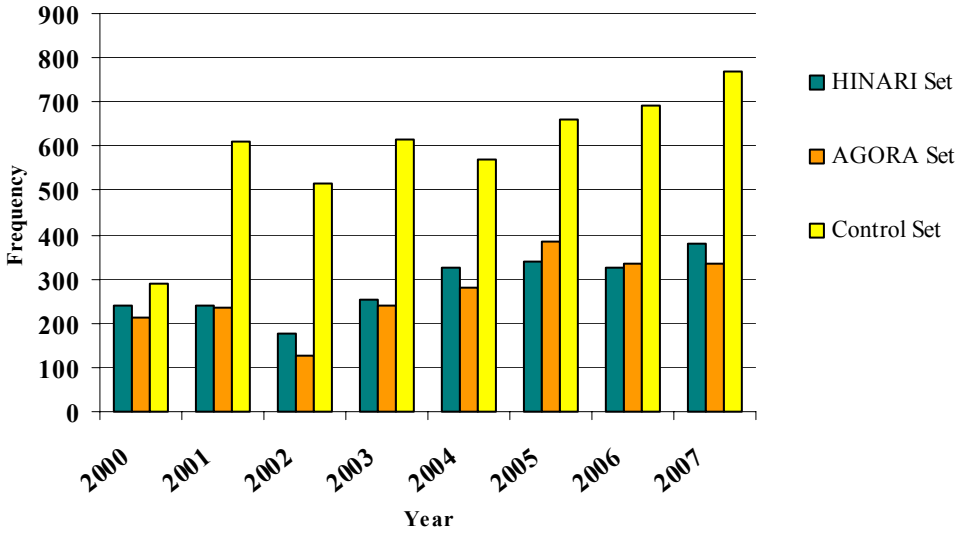


Figure C.121 Frequency of Citations Made by Guatemala Researchers

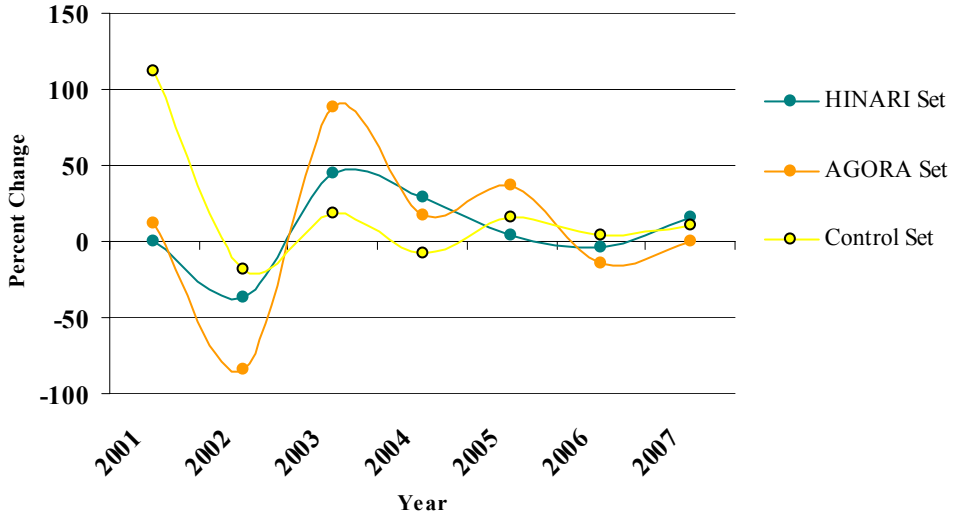


Figure C.122 Percent Change in Frequency of Citations Made by Guatemala Researchers

Table C.61 Average Percent Change in Frequency of Citations Made by Guatemala Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
35.9049	-11.9749	4.2403	-11.7648

C.2.2.3 Honduras

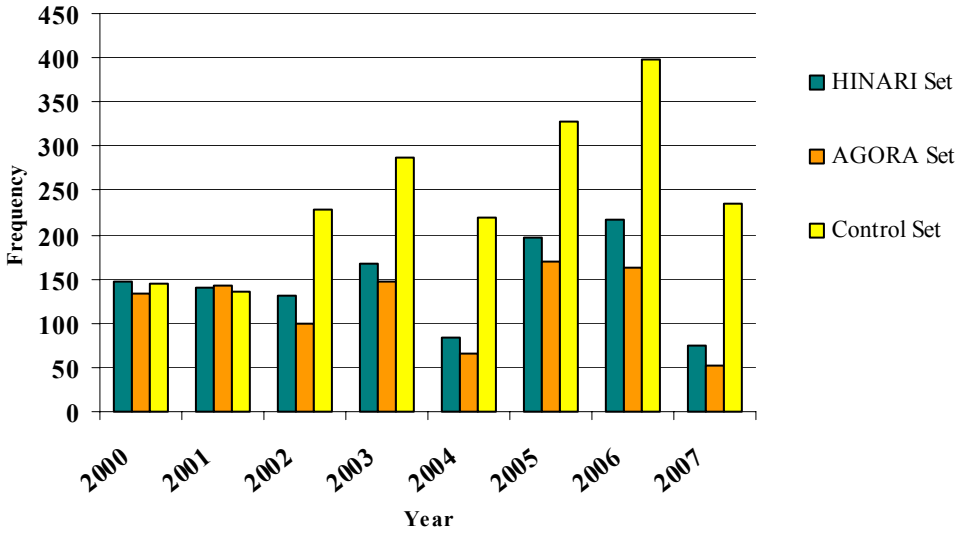


Figure C.123 Frequency of Citations Made by Honduras Researchers

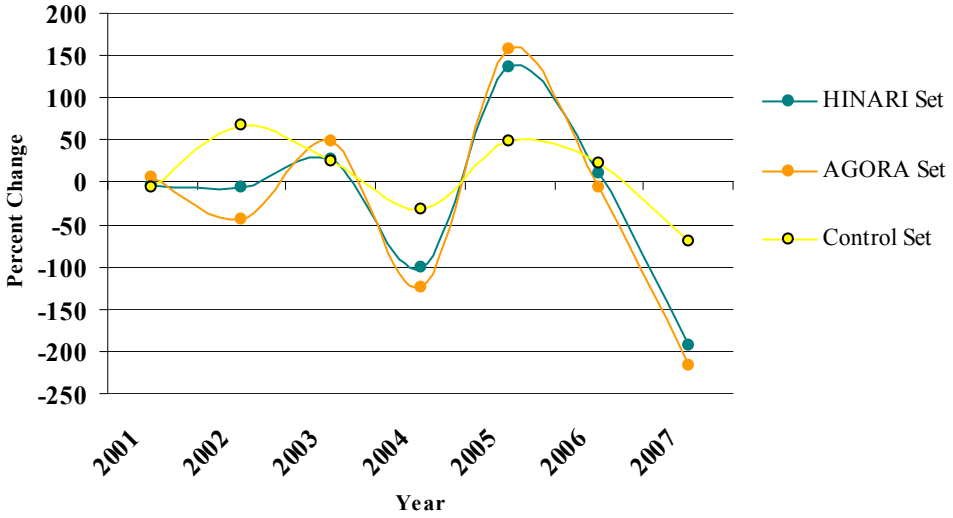


Figure C.124 Percent Change in Frequency of Citations Made by Honduras Researchers

Table C.62 Average Percent Change in Frequency of Citations Made by Honduras Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-19.0416	-26.9747	-51.5888	-33.4039

C.2.2.4 Nicaragua

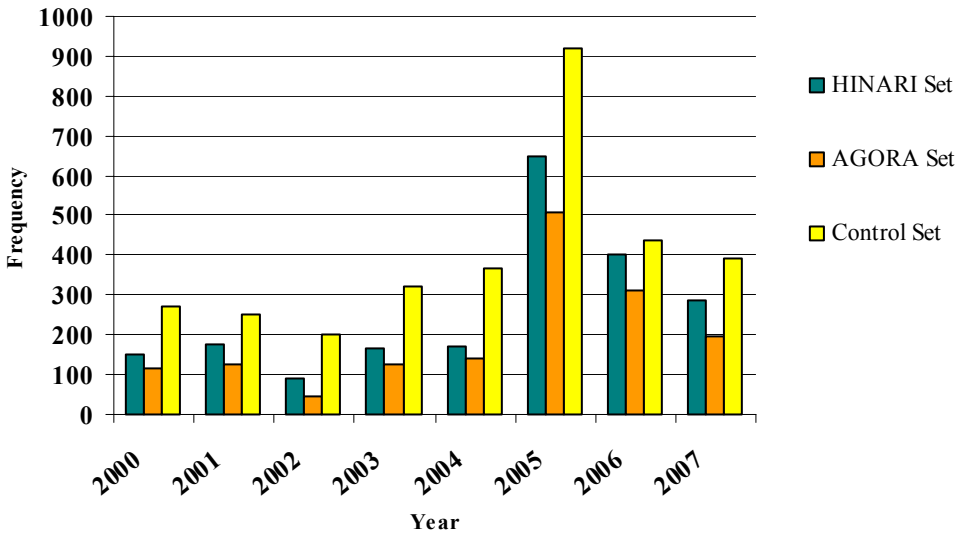


Figure C.125 Frequency of Citations Made by Nicaragua Researchers

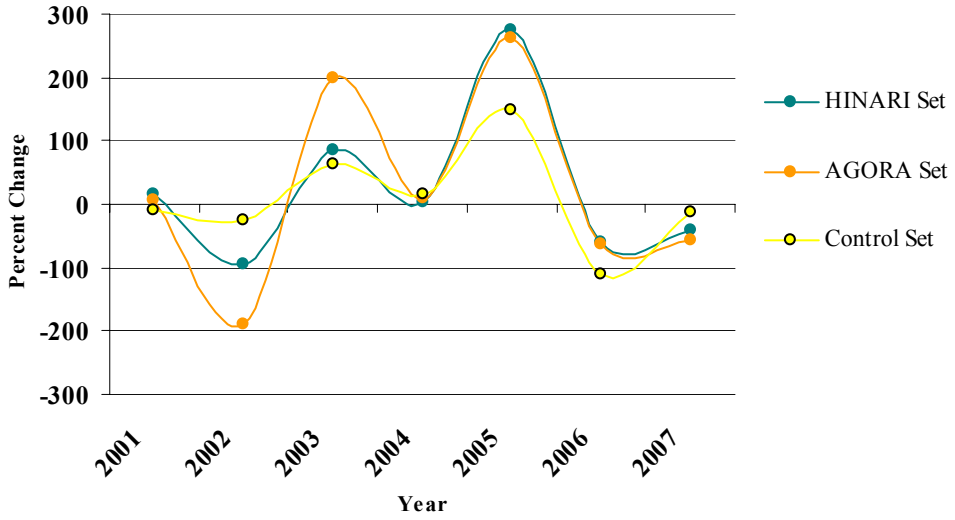


Figure C.126 Percent Change in Frequency of Citations Made by Nicaragua Researchers

Table C.63 Average Percent Change in Frequency of Citations Made by Nicaragua Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
92.5166	15.9420	33.0953	13.5120

C.2.3 South America

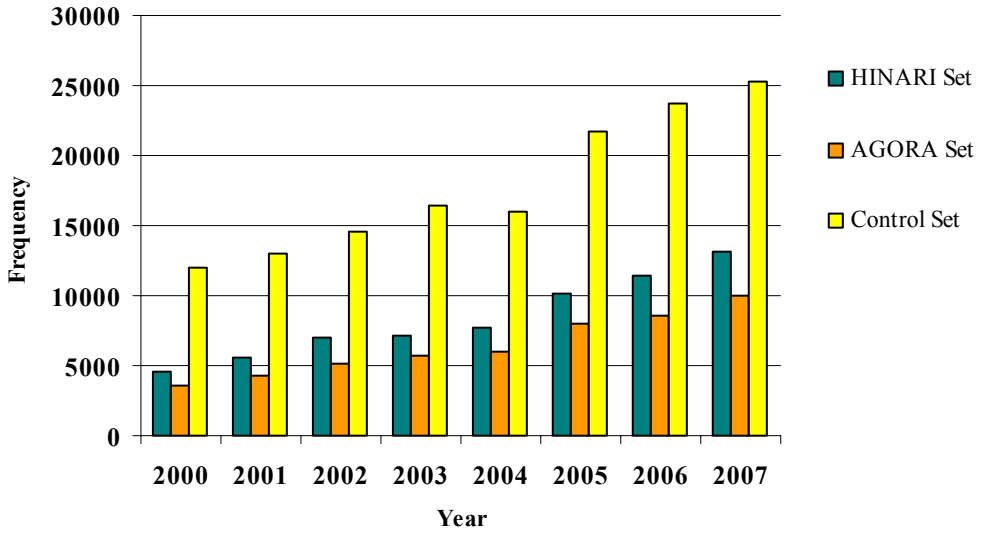


Figure C.127 Frequency of Citations Made by Eligible South American Researchers

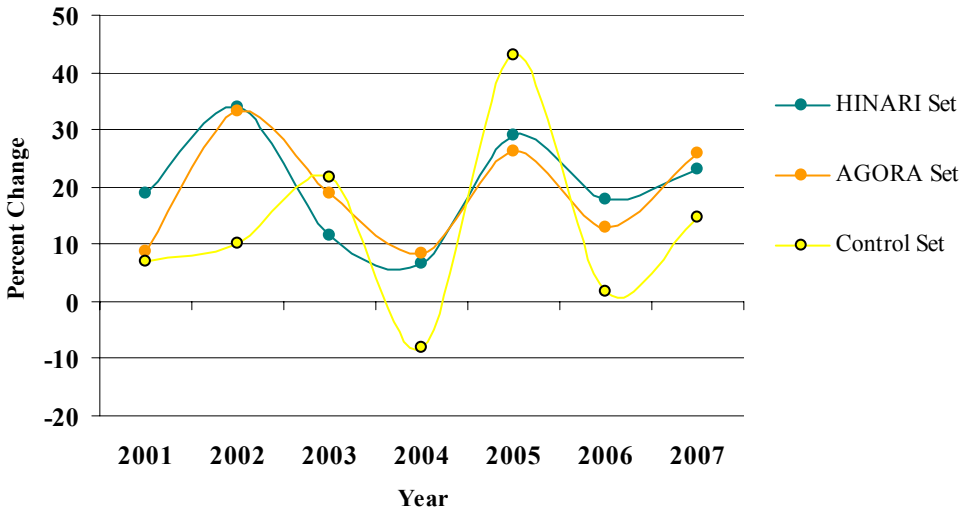


Figure C.128 Percent Change in Frequency of Citations Made by Eligible South American Researchers

Table C.64 Average Percent Change in Frequency of Citations Made by Eligible South American Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-8.9579	4.9395	-0.6475	4.5305

C.2.3.1 Bolivia

Figure C.129 Frequency of Citations Made by Bolivia Researchers

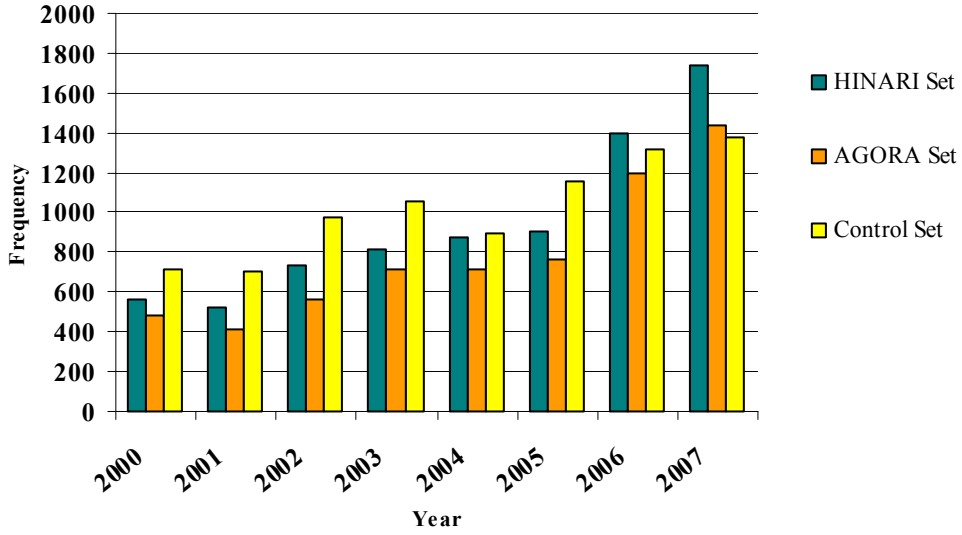


Figure C.130 Percent Change in Frequency of Citations Made by Bolivia Researchers

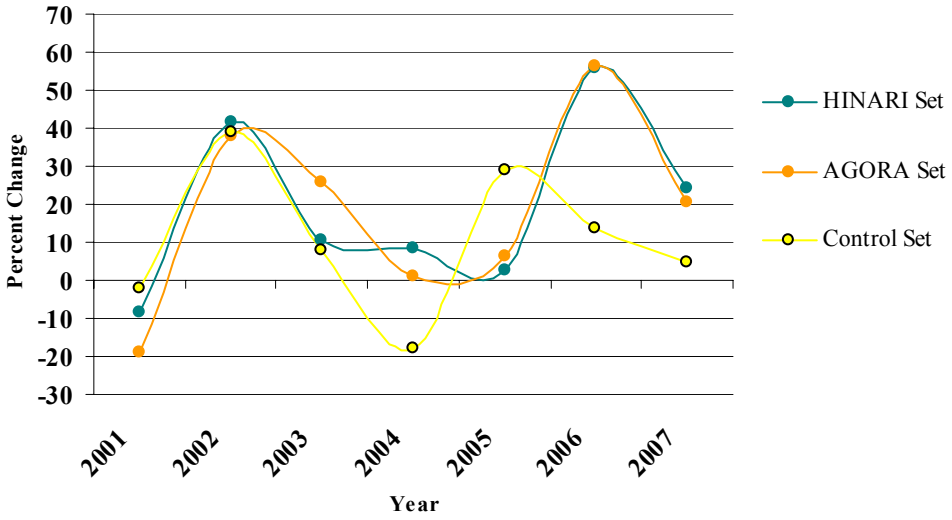


Table C.65 Average Percent Change in Frequency of Citations Made by Bolivia Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
3.5606	8.5686	6.1464	7.7669

C.2.3.2 Ecuador

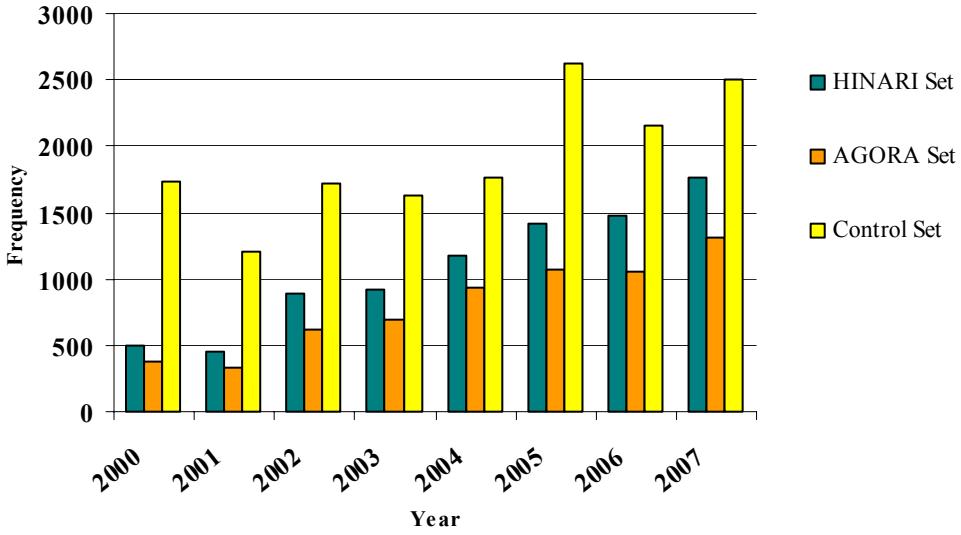


Figure C.131 Frequency of Citations Made by Ecuador Researchers

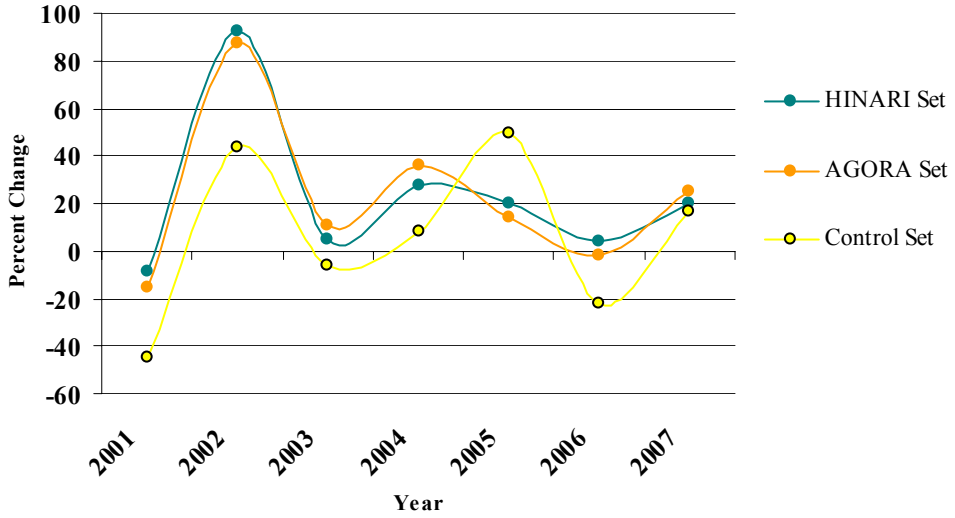


Figure C.132 Percent Change in Frequency of Citations Made by Ecuador Researchers

Table C.66 Average Percent Change in Frequency of Citations Made by Ecuador Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-26.6508	16.5226	-8.8281	15.9131

C.2.3.3 Guyana

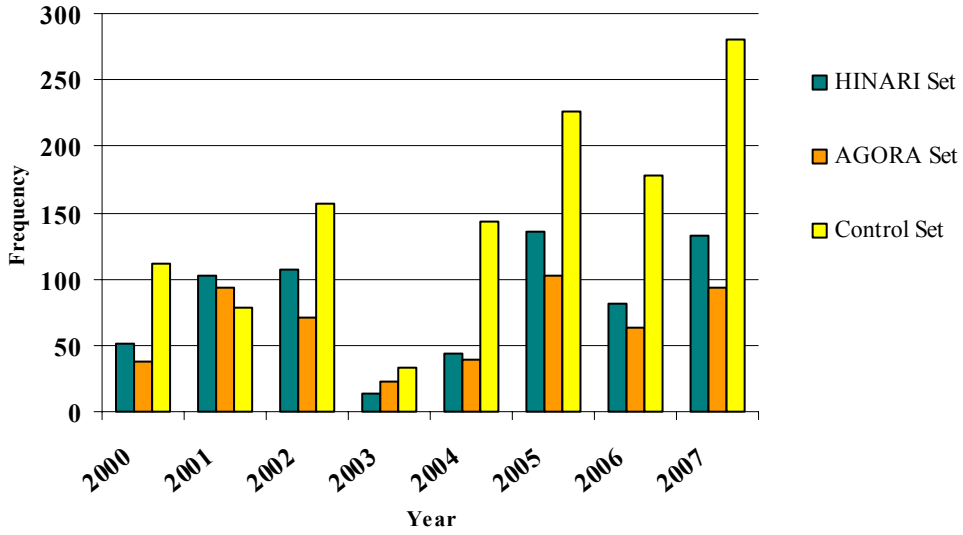


Figure C.133 Frequency of Citations Made by Guyana Researchers

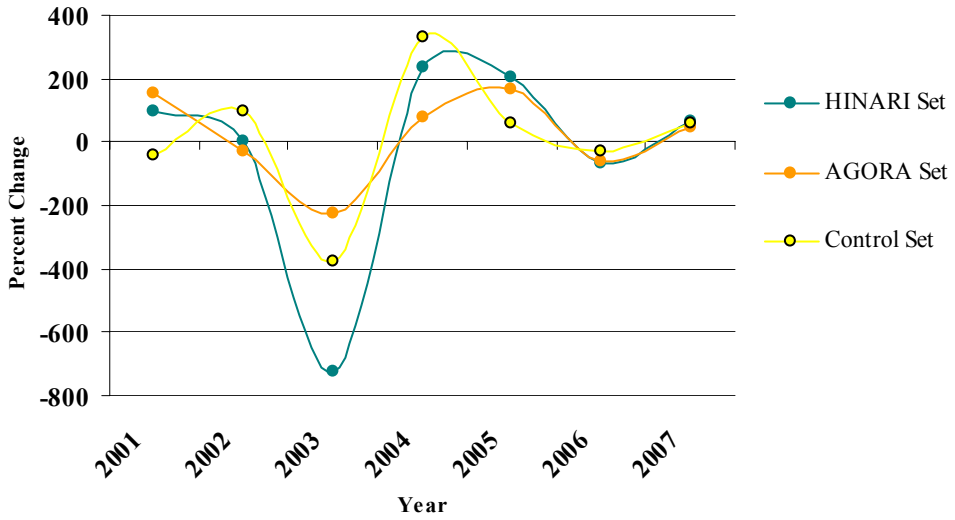


Figure C.134 Percent Change in Frequency of Citations Made by Guyana Researchers

Table C.67 Average Percent Change in Frequency of Citations Made by Guyana Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-107.0275	-40.1704	90.1268	3.1094

C.2.3.4 Paraguay

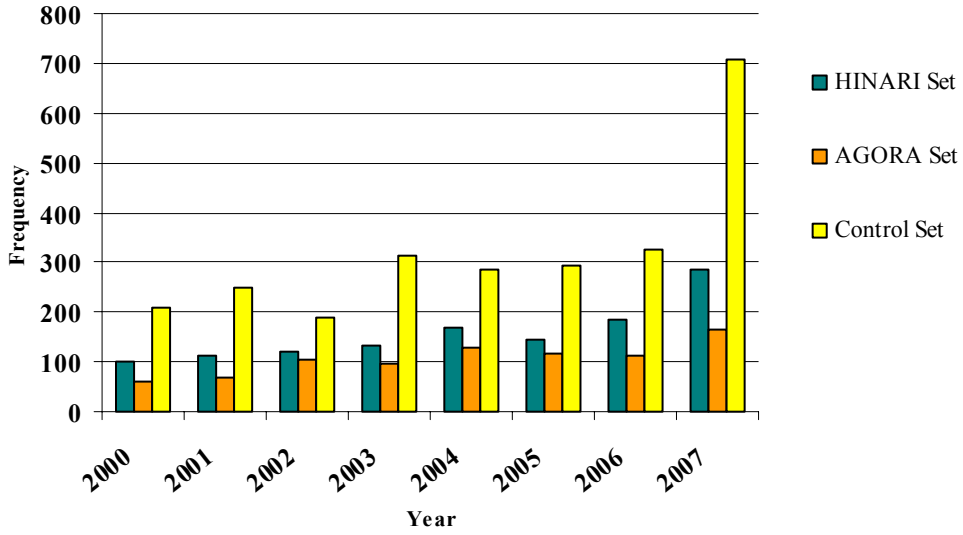


Figure C.135 Frequency of Citations Made by Paraguay Researchers

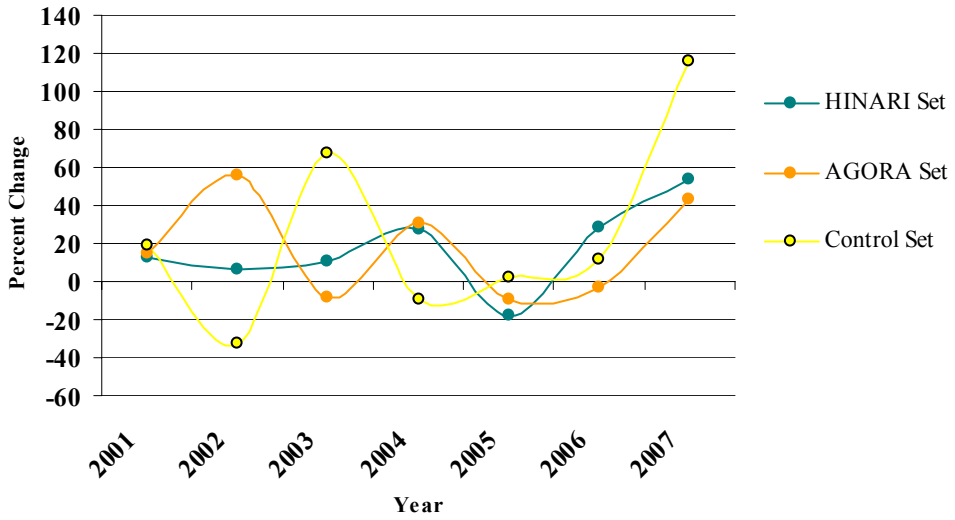


Figure C.136 Percent Change in Frequency of Citations Made by Paraguay Researchers

Table C.68 Average Percent Change in Frequency of Citations Made by Paraguay Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
11.0274	-7.2757	-5.6008	-6.9591

C.2.3.5 Peru

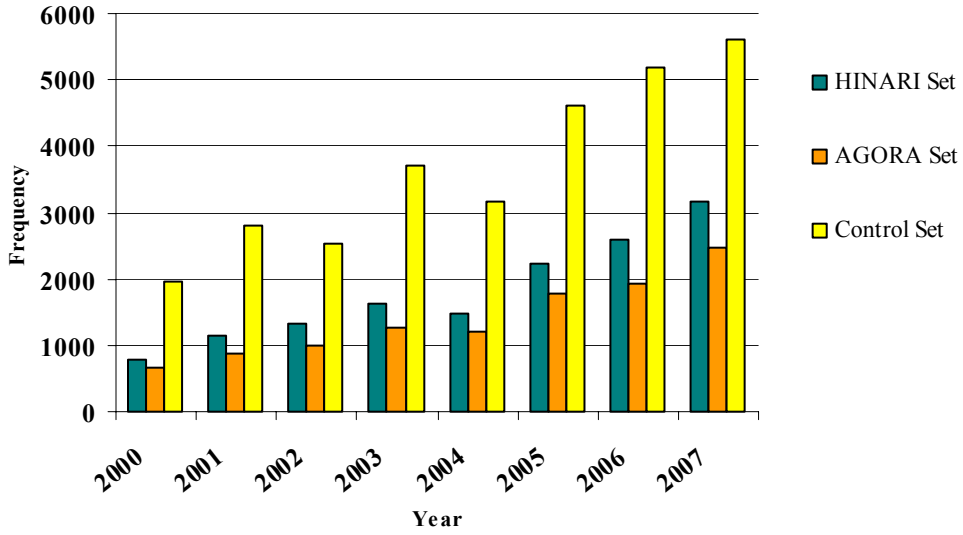


Figure C.137 Frequency of Citations Made by Peru Researchers

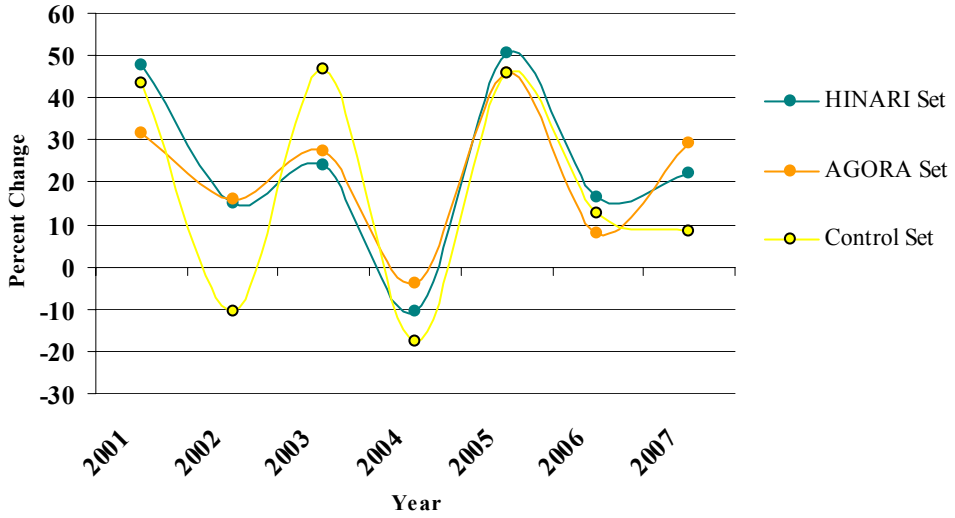


Figure C.138 Percent Change in Frequency of Citations Made by Peru Researchers

Table C.69 Average Percent Change in Frequency of Citations Made by Peru Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-10.9522	5.2255	-5.1359	3.5472

C.2.3.6 Suriname

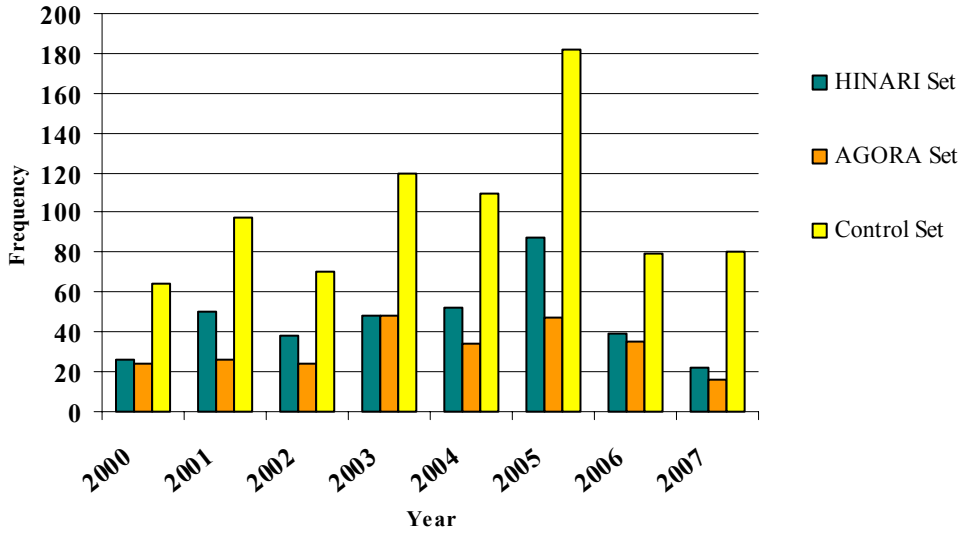


Figure C.139 Frequency of Citations Made by Suriname Researchers

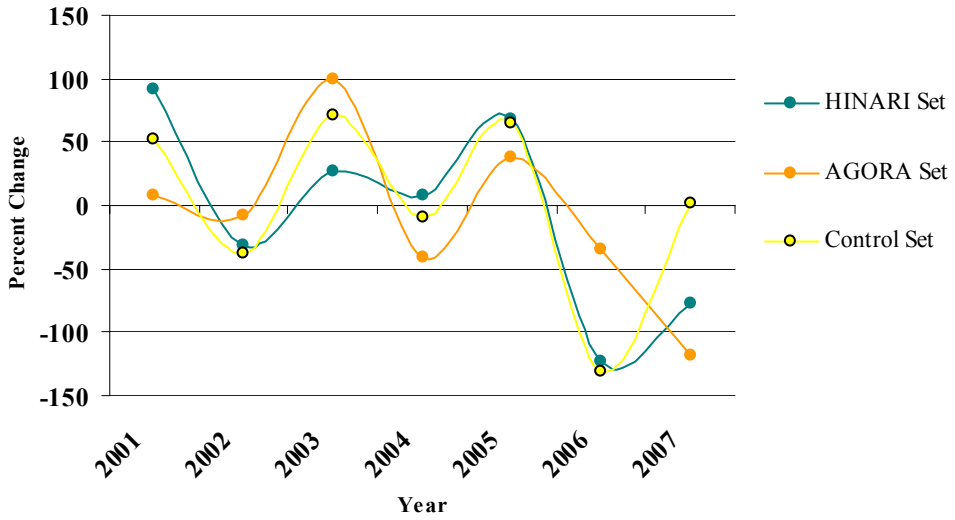


Figure C.140 Percent Change in Frequency of Citations Made by Suriname Researchers

Table C.70 Average Percent Change in Frequency of Citations Made by Suriname Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-50.0429	-7.0476	-72.3276	-9.6637

C.3 Asia

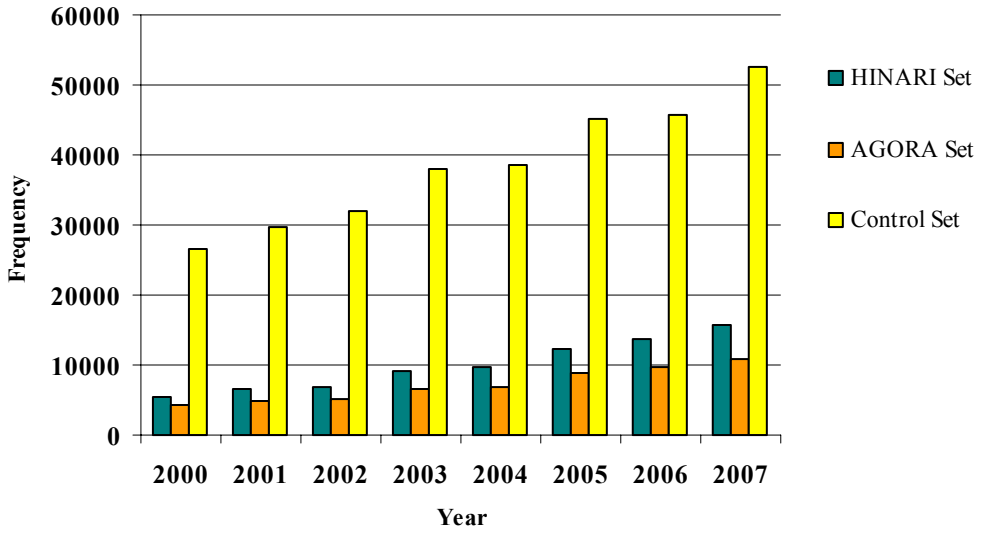


Figure C.141 Frequency of Citations Made by Eligible Asian Researchers

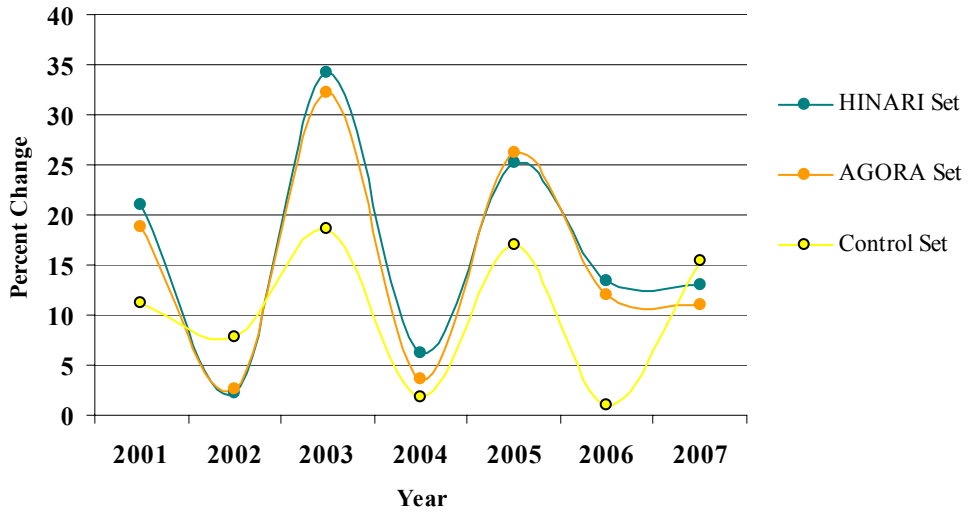


Figure C.142 Percent Change in Frequency of Citations Made by Eligible Asian Researchers

Table C.71 Average Percent Change in Frequency of Citations Made by Eligible Asian Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
6.7911	6.0780	-4.5927	4.7619

C.3.1 Central Asia

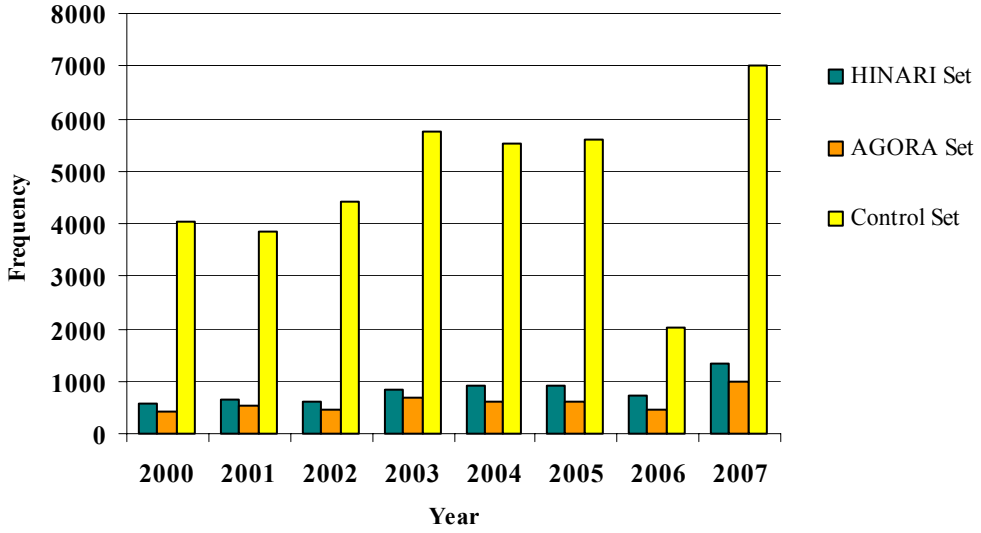


Figure C.143 Frequency of Citations Made by Eligible Central Asian Researchers

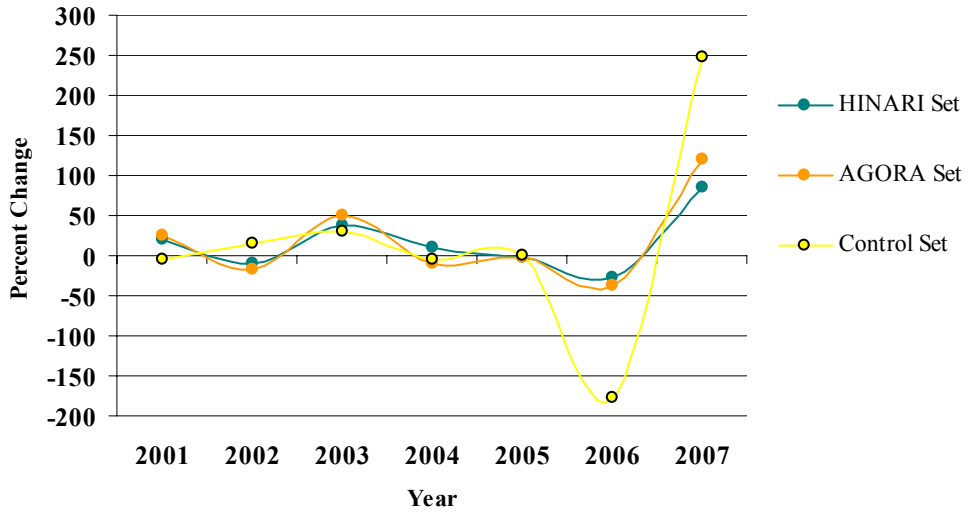


Figure C.144 Percent Change in Frequency of Citations Made by Eligible Central Asian Researchers

Table C.72 Average Percent Change in Frequency of Citations Made by Eligible Central Asian Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
15.5449	0.9482	-1.7540	2.6095

C.3.1.1 Kazakhstan

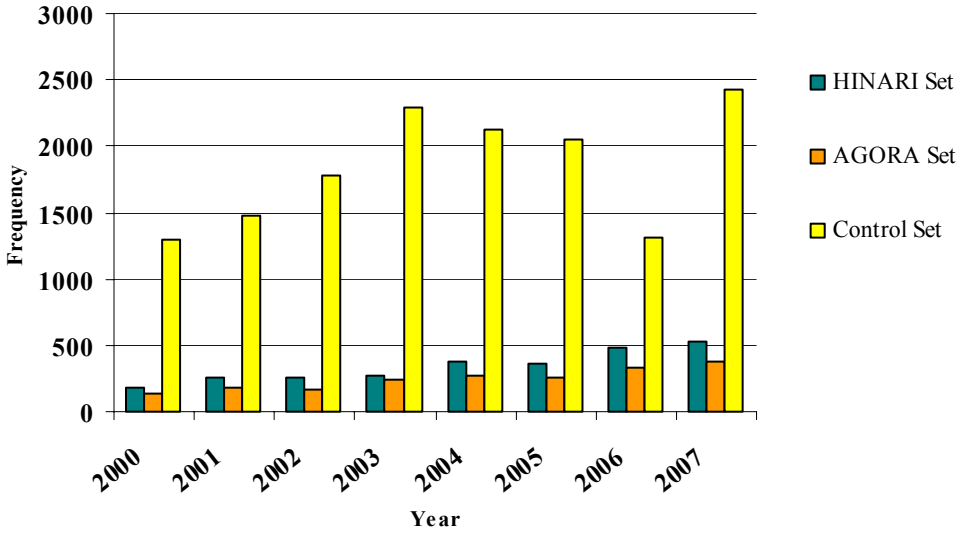


Figure C.145 Frequency of Citations Made by Kazakhstan Researchers

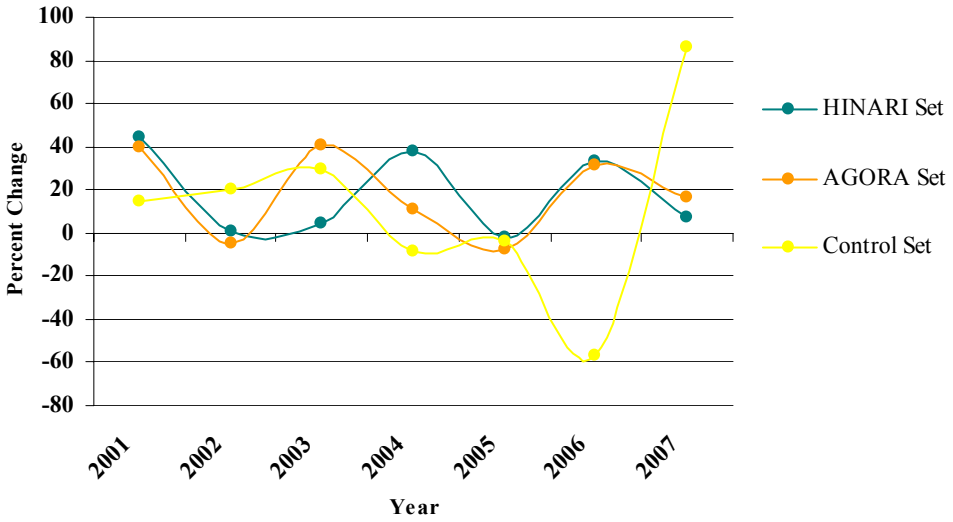


Figure C.146 Percent Change in Frequency of Citations Made by Kazakhstan Researchers

Table C.73 Average Percent Change in Frequency of Citations Made by Kazakhstan Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-6.4414	6.4334	-12.2285	6.5335

C.3.1.2 Kyrgyzstan

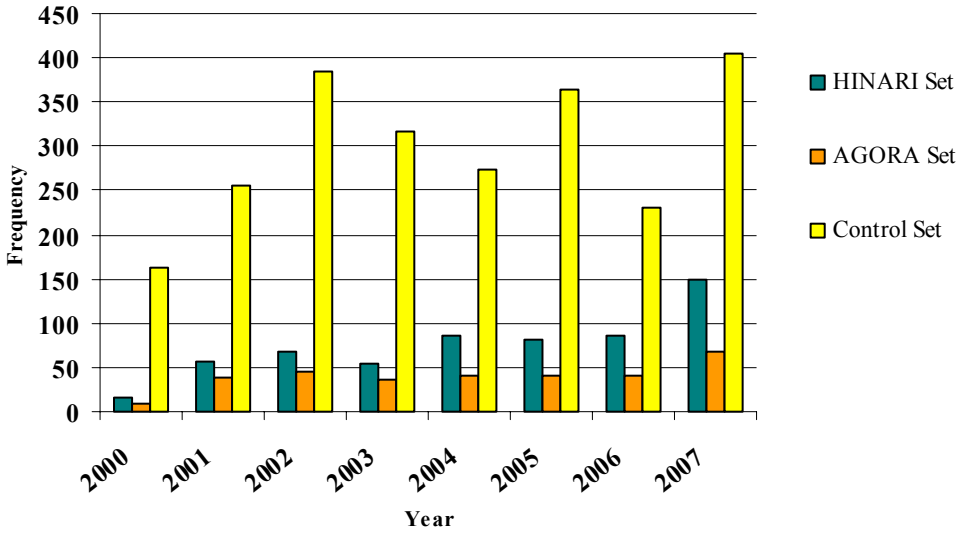


Figure C.147 Frequency of Citations Made by Kyrgyzstan Researchers

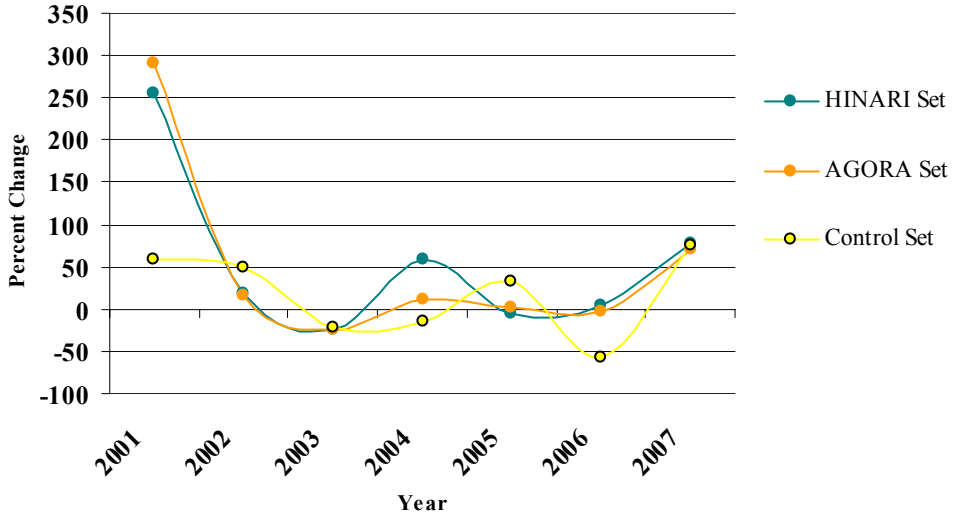


Figure C.148 Percent Change in Frequency of Citations Made by Kyrgyzstan Researchers

Table C.74 Average Percent Change in Frequency of Citations Made by Kyrgyzstan Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-114.8127	37.5329	-73.1838	34.2872

C.3.1.3 Tajikistan

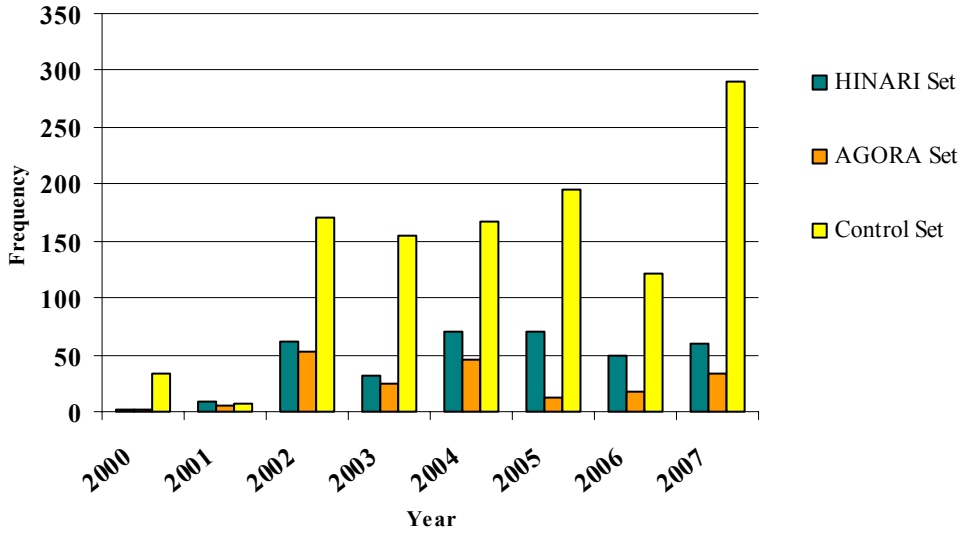


Figure C.149 Frequency of Citations Made by Tajikistan Researchers

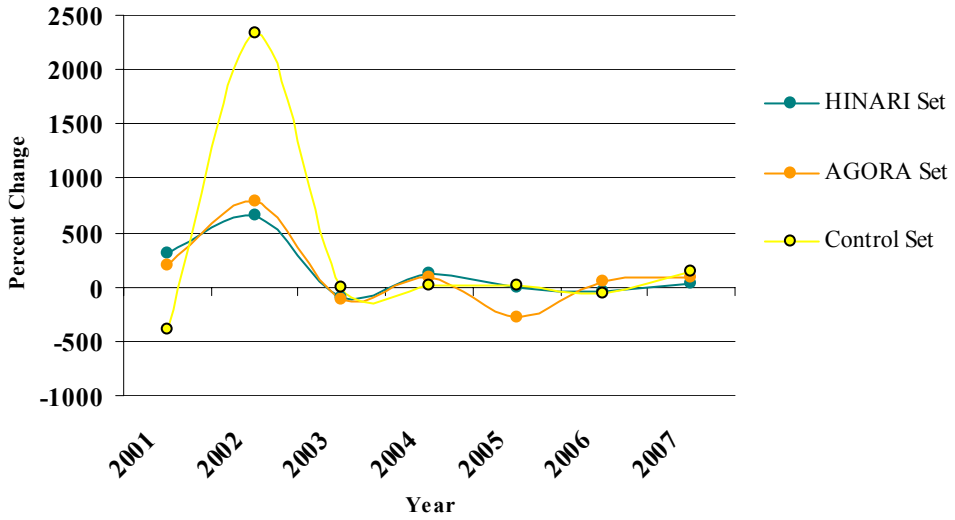


Figure C.150 Percent Change in Frequency of Citations Made by Tajikistan Researchers

Table C.75 Average Percent Change in Frequency of Citations Made by Tajikistan Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-479.8291	-154.2870	-300.6944	-177.1273

C.3.1.4 Turkmenistan

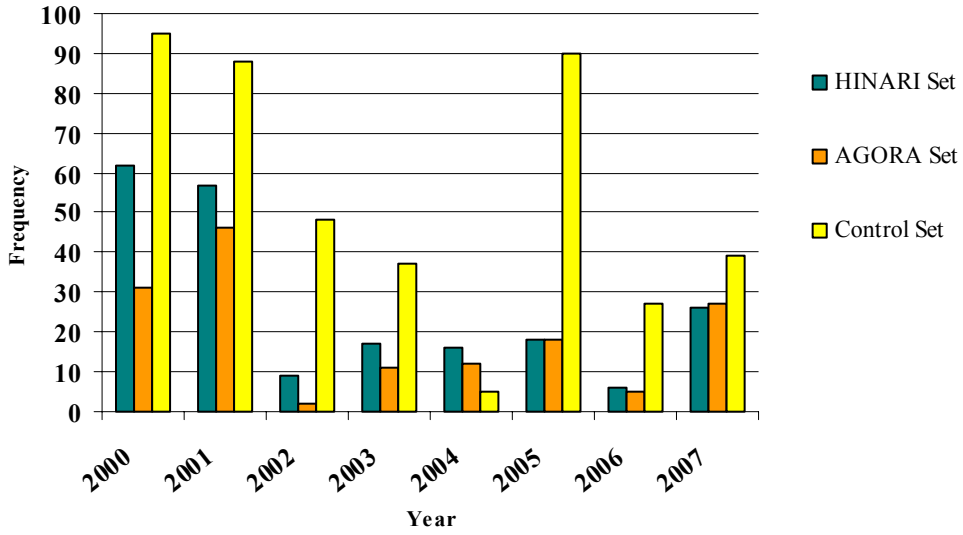


Figure C.151 Frequency of Citations Made by Turkmenistan Researchers

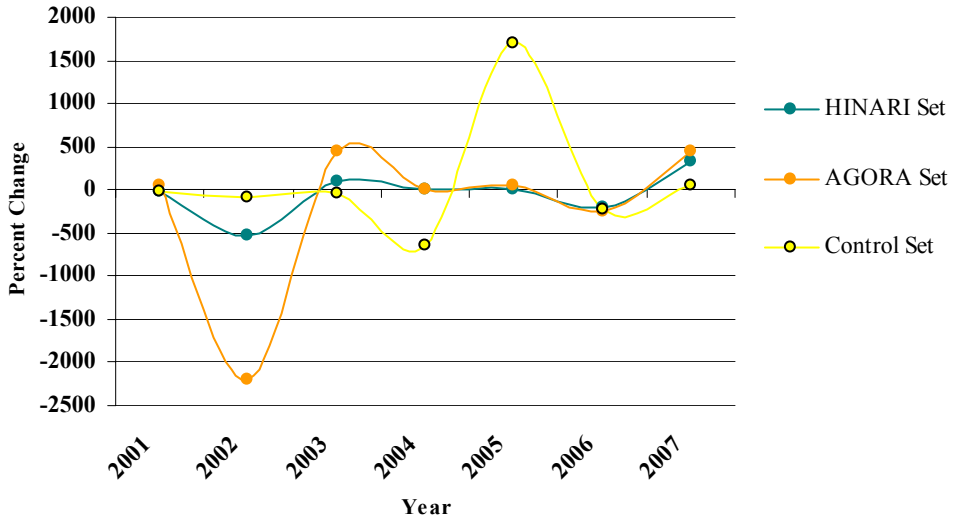


Figure C.152 Percent Change in Frequency of Citations Made by Turkmenistan Researchers

Table C.76 Average Percent Change in Frequency of Citations Made by Turkmenistan Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
316.7471	-151.9609	626.9770	-316.0879

C.3.1.5 Uzbekistan

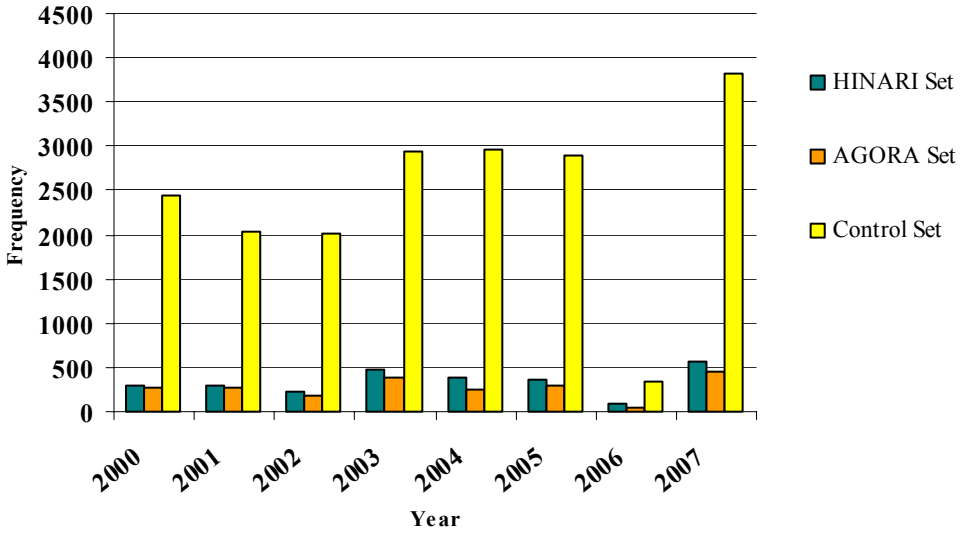


Figure C.153 Frequency of Citations Made by Uzbekistan Researchers

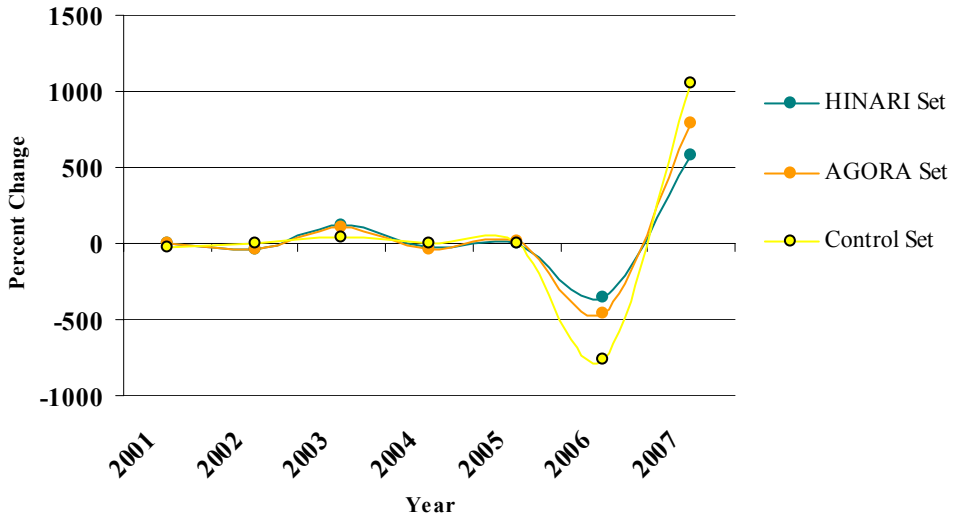


Figure C.154 Percent Change in Frequency of Citations Made by Uzbekistan Researchers

Table C.77 Average Percent Change in Frequency of Citations Made by Uzbekistan Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
83.1128	-3.1767	54.0193	6.8833

C.3.2 Eastern Asia

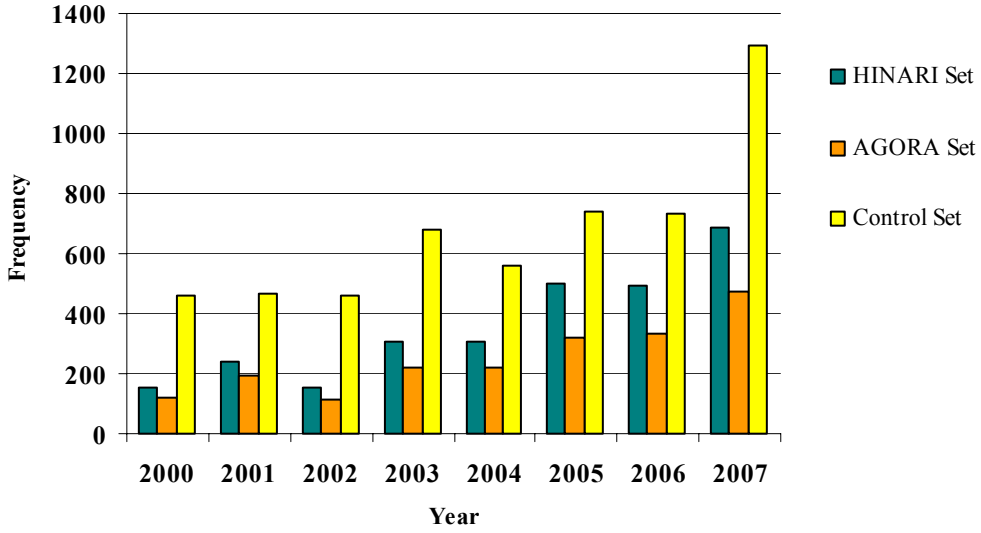


Figure C.155 Frequency of Citations Made by Eligible Eastern Asian Researchers

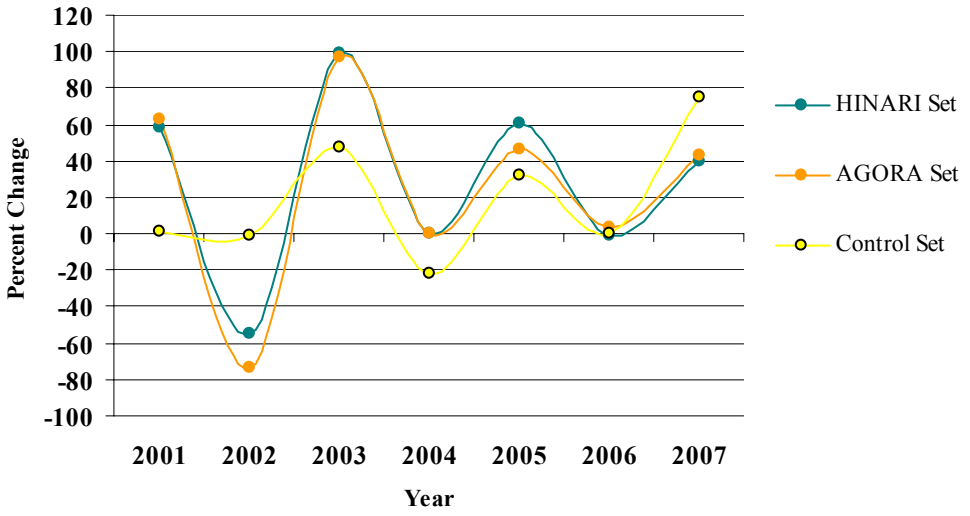


Figure C.156 Percent Change in Frequency of Citations Made by Eligible Eastern Asian Researchers

Table C.78 Average Percent Change in Frequency of Citations Made by Eligible Eastern Asian Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
38.1708	9.7732	-5.5618	6.5487

C.3.2.1 Mongolia

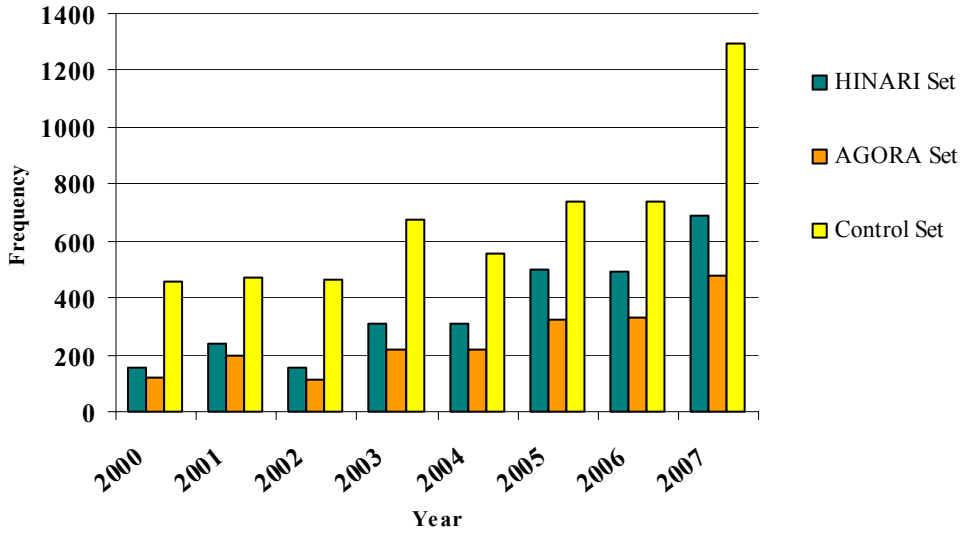


Figure C.157 Frequency of Citations Made by Mongolia Researchers

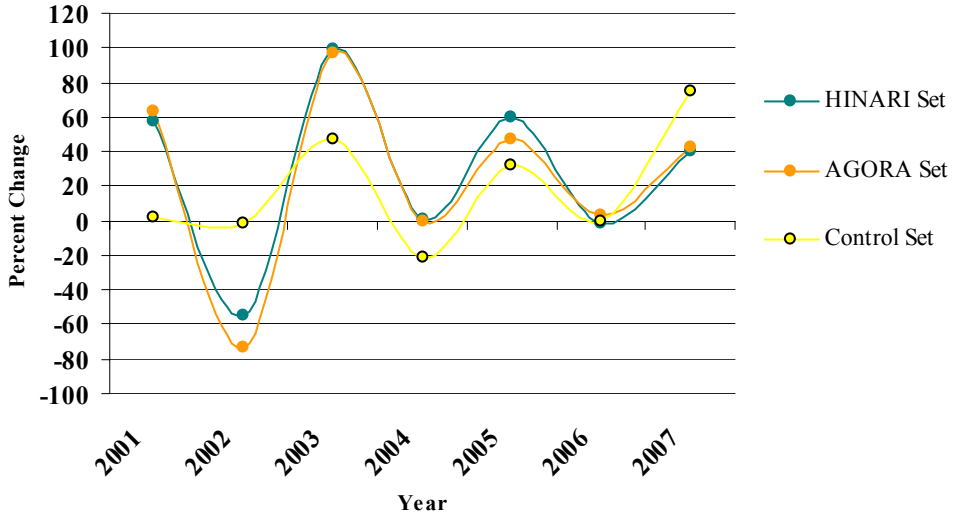


Figure C.158 Percent Change in Frequency of Citations Made by Mongolia Researchers

Table C.79 Average Percent Change in Frequency of Citations Made by Mongolia Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
38.1708	9.7732	-5.5618	6.5487

C.3.3 South-eastern Asia

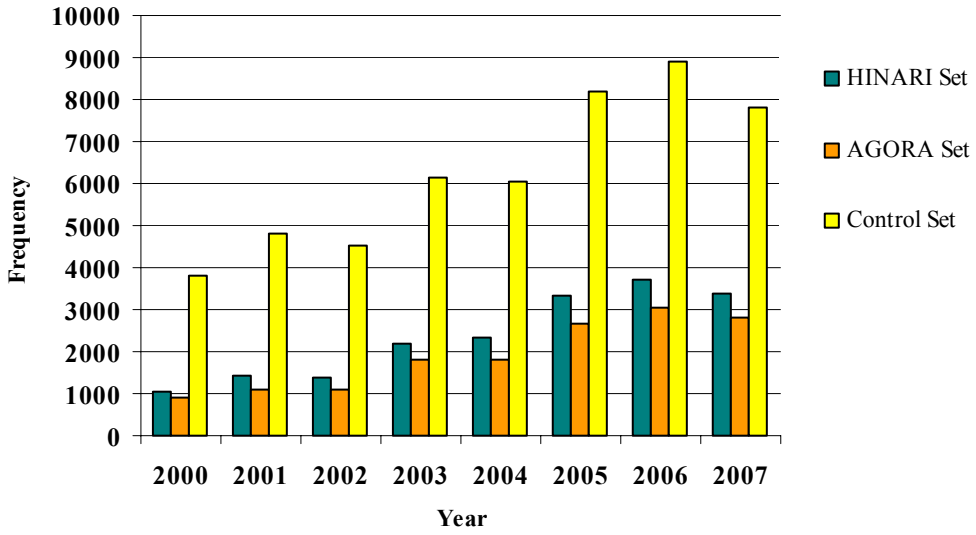


Figure C.159 Frequency of Citations Made by Eligible South-eastern Asian Researchers

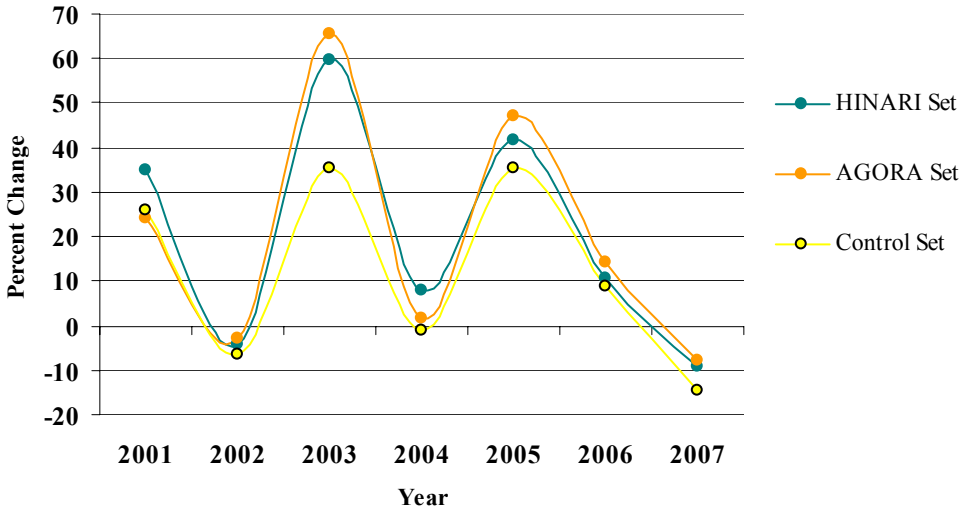


Figure C.160 Percent Change in Frequency of Citations Made by Eligible South-eastern Asian Researchers

Table C.80 Average Percent Change in Frequency of Citations Made by Eligible South-eastern Asian Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
6.9208	8.3177	-15.2553	8.3193

C.3.3.1 Cambodia

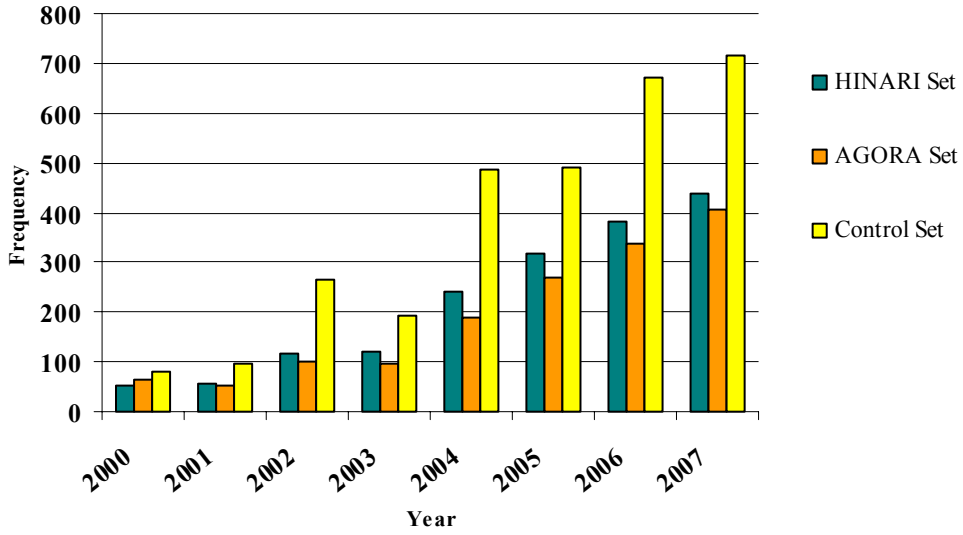


Figure C.161 Frequency of Citations Made by Cambodia Researchers

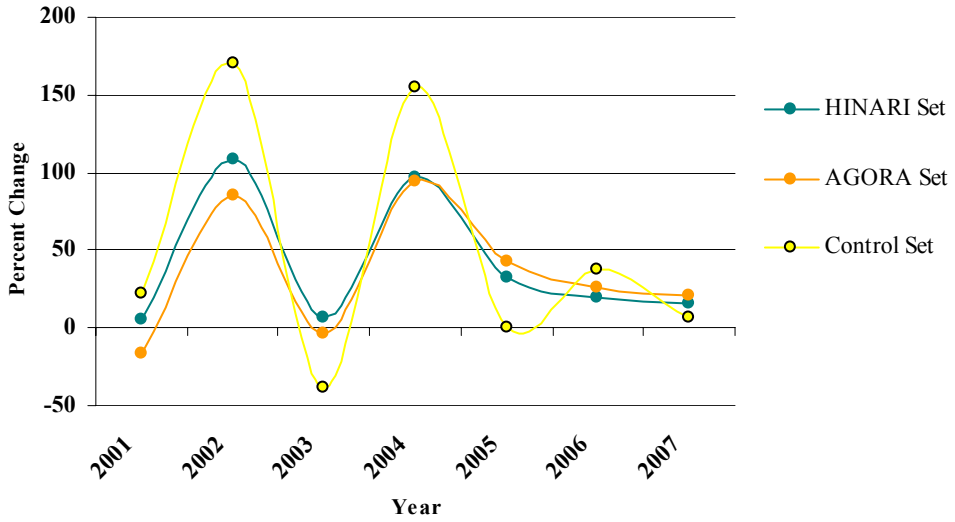


Figure C.162 Percent Change in Frequency of Citations Made by Cambodia Researchers

Table C.81 Average Percent Change in Frequency of Citations Made by Cambodia Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-23.3098	-9.6349	24.0749	-14.8494

C.3.3.2 Laos

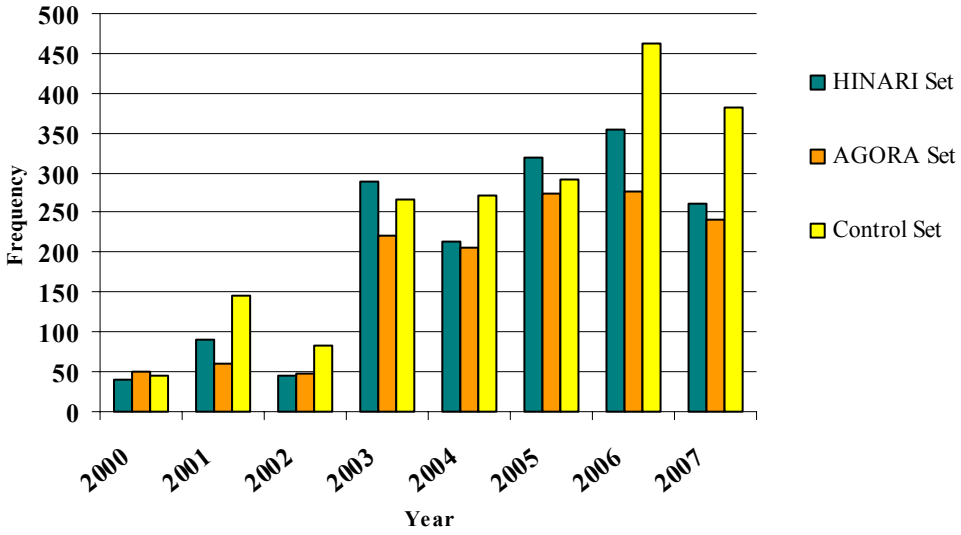


Figure C.163 Frequency of Citations Made by Laos Researchers

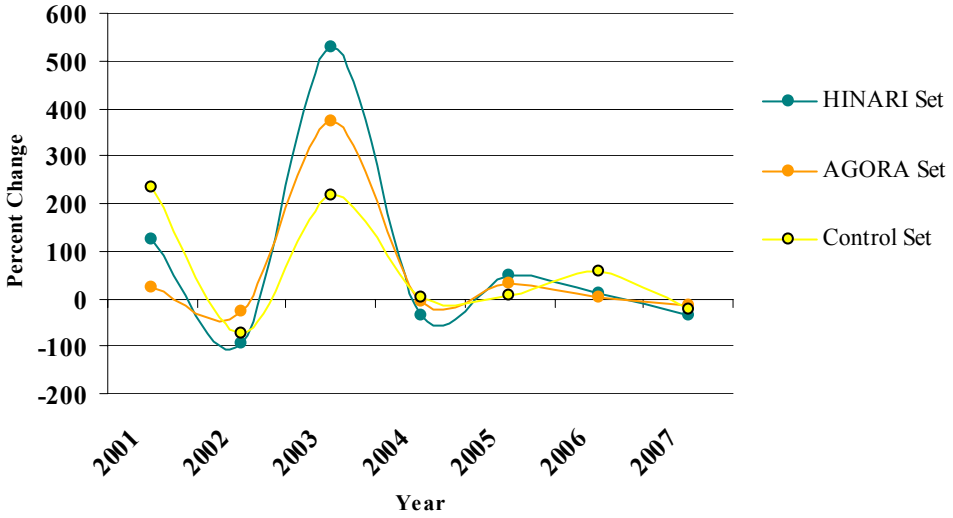


Figure C.164 Percent Change in Frequency of Citations Made by Laos Researchers

Table C.82 Average Percent Change in Frequency of Citations Made by Laos Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
88.9666	18.0325	-119.6027	-6.1568

C.3.3.3 Myanmar

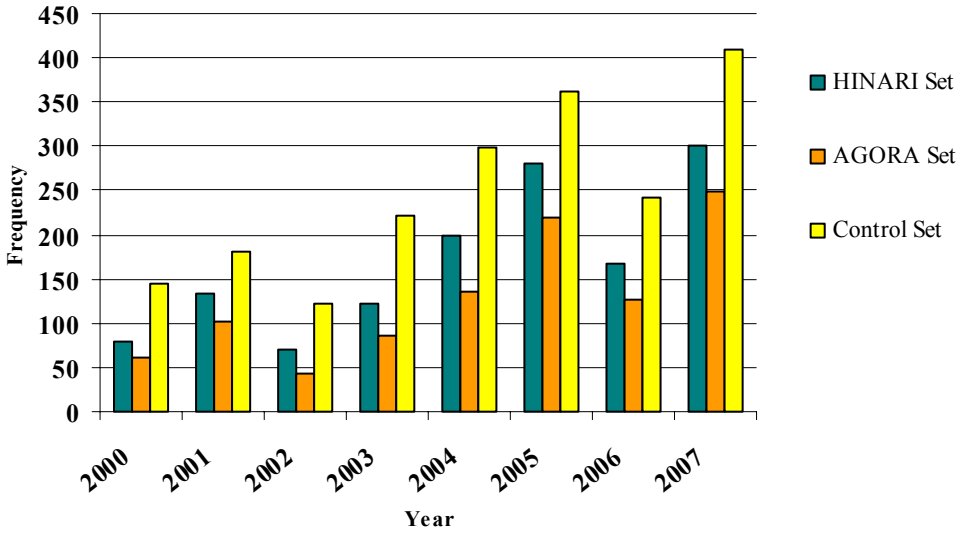


Figure C.165 Frequency of Citations Made by Myanmar Researchers

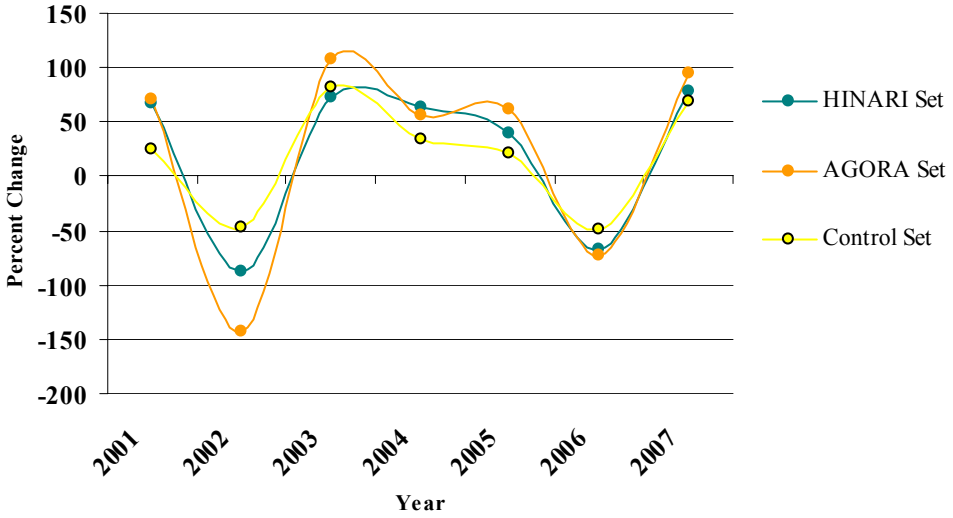


Figure C.166 Percent Change in Frequency of Citations Made by Myanmar Researchers

Table C.83 Average Percent Change in Frequency of Citations Made by Myanmar Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
48.0710	4.5178	23.6049	5.6354

C.3.3.4 Timor-Leste

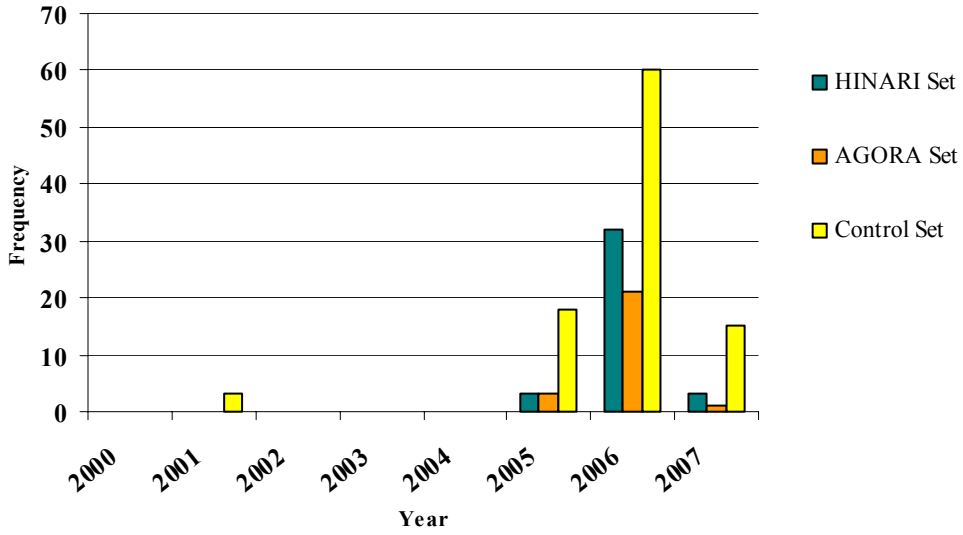


Figure C.167 Frequency of Citations Made by Timor-Leste Researchers

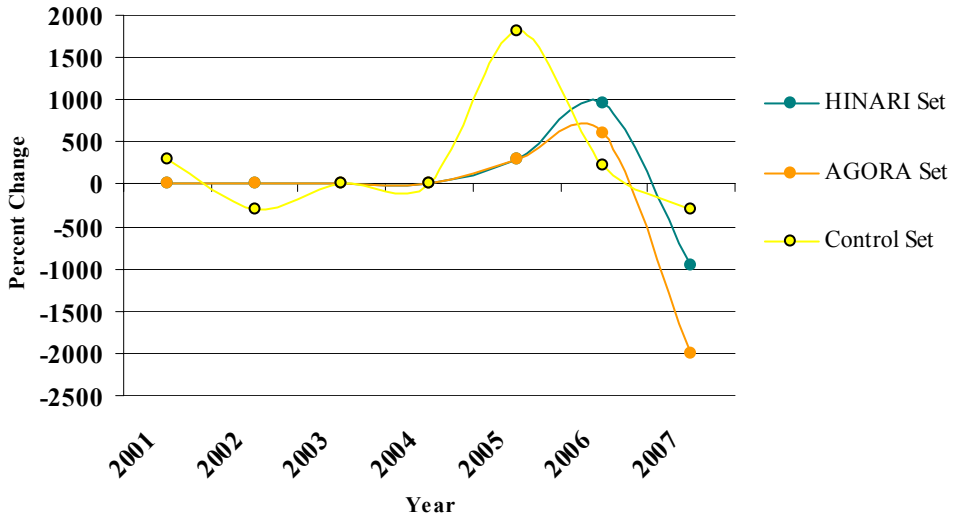


Figure C.168 Percent Change in Frequency of Citations Made by Timor-Leste Researchers

Table C.84 Average Percent Change in Frequency of Citations Made by Timor-Leste Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
60.0000	-204.7619	-275.0000	-404.7619

C.3.3.5 Viet Nam

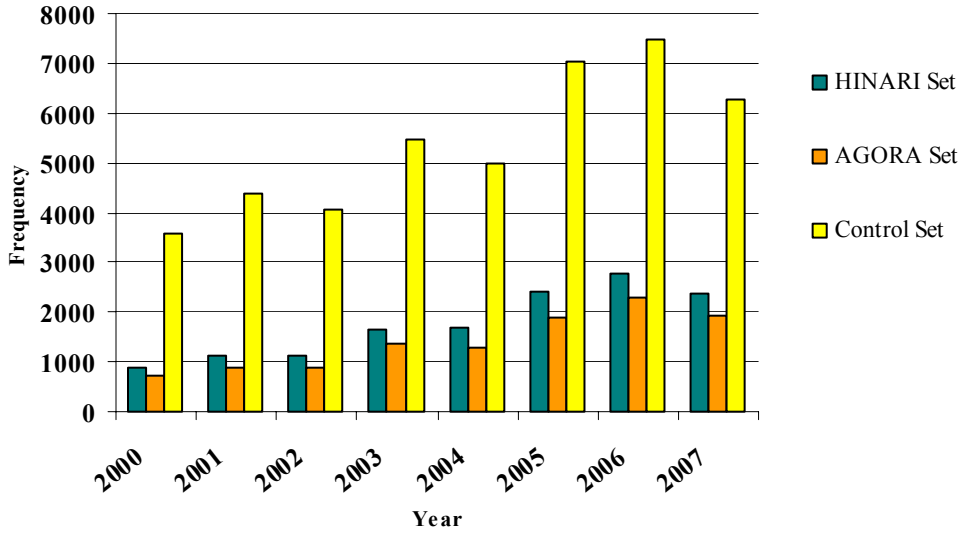


Figure C.169 Frequency of Citations Made by Viet Nam Researchers

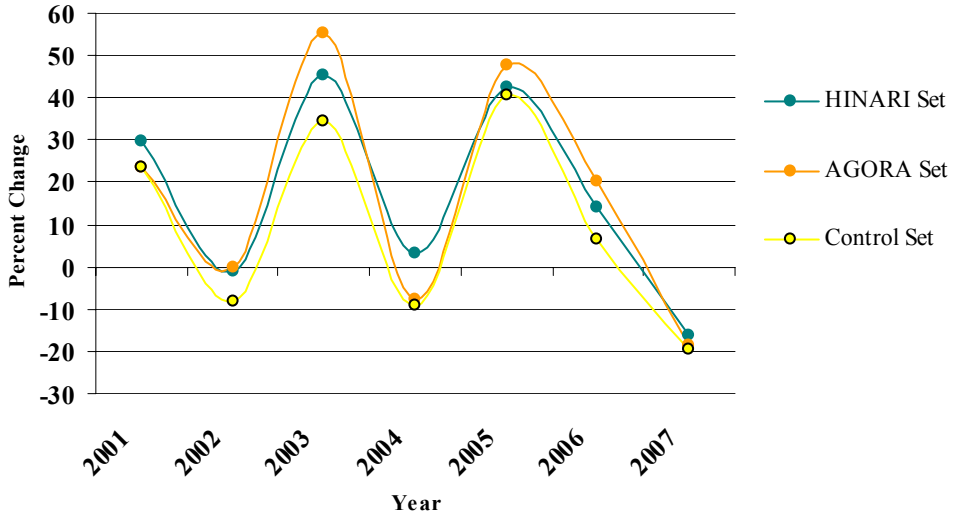


Figure C.170 Percent Change in Frequency of Citations Made by Viet Nam Researchers

Table C.85 Average Percent Change in Frequency of Citations Made by Viet Nam Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
3.5287	7.0358	-15.6701	7.4496

C.3.3 Southern Asia

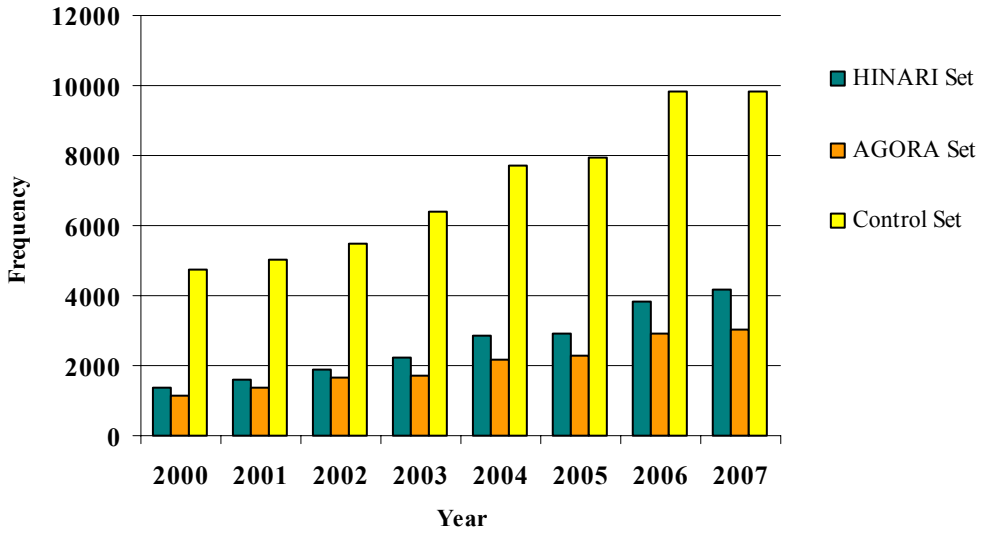


Figure C.171 Frequency of Citations Made by Eligible Southern Asian Researchers

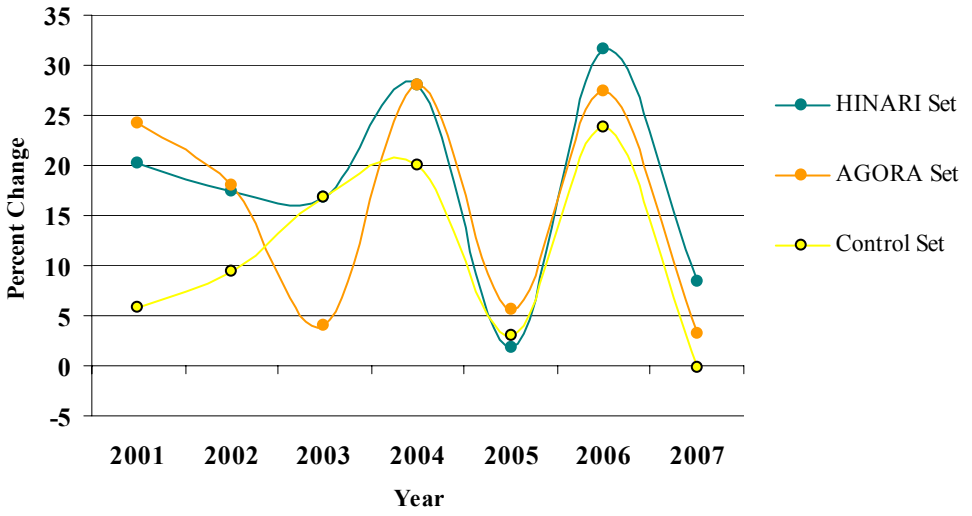


Figure C.172 Percent Change in Frequency of Citations Made by Eligible Southern Asian Researchers

Table C.86 Average Percent Change in Frequency of Citations Made by Eligible Southern Asian Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-1.4424	6.5308	0.6614	4.5147

C.3.4.1 Afghanistan

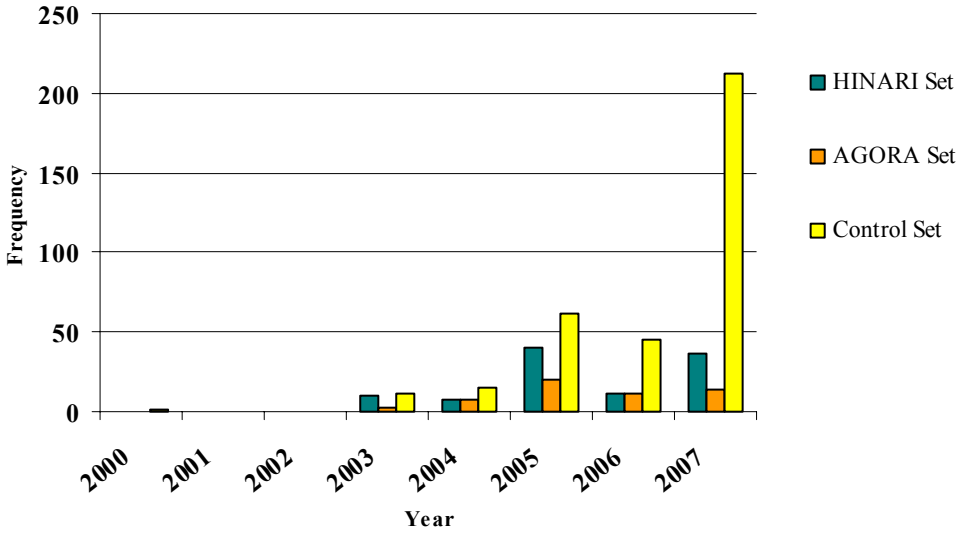


Figure C.173 Frequency of Citations Made by Afghanistan Researchers

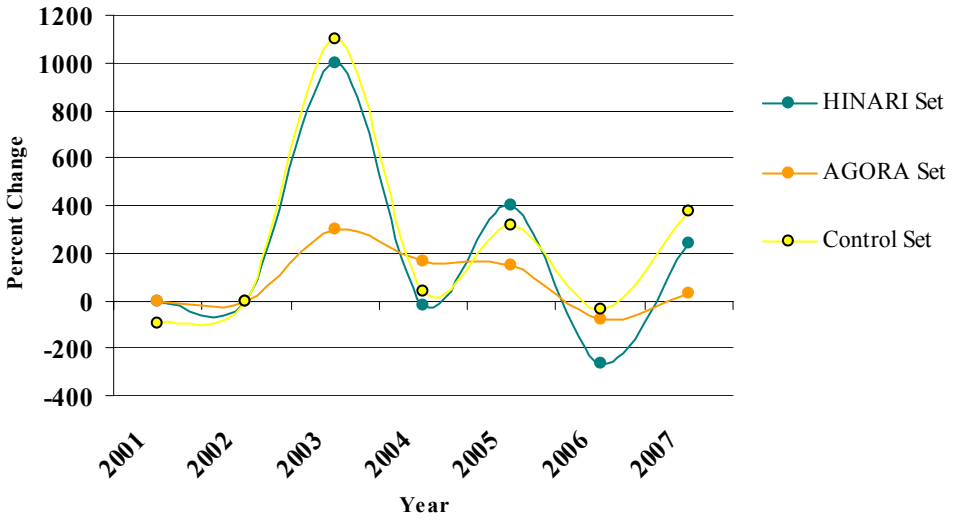


Figure C.174 Percent Change in Frequency of Citations Made by Afghanistan Researchers

Table C.87 Average Percent Change in Frequency of Citations Made by Afghanistan Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
269.5455	-47.9004	-34.4697	-160.1299

C.3.4.2 Bangladesh

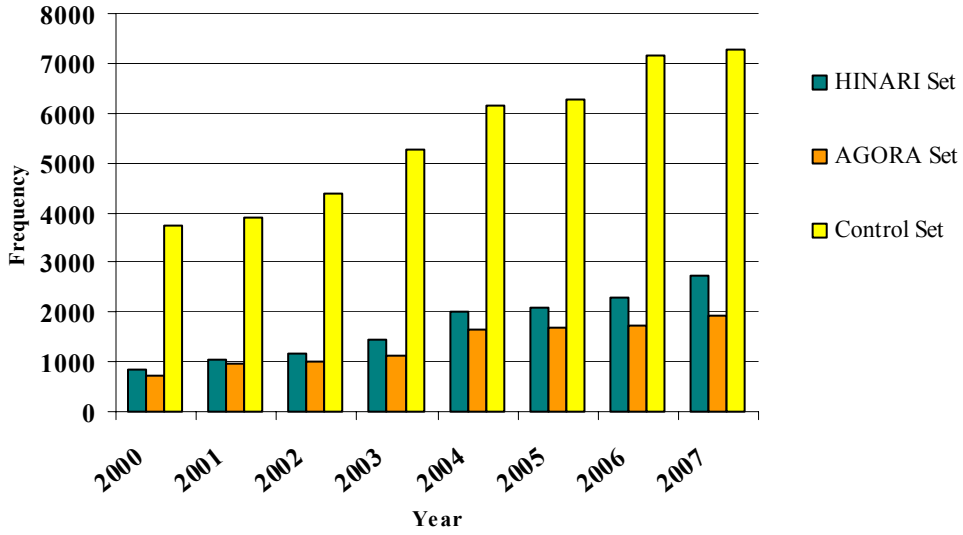


Figure C.175 Frequency of Citations Made by Bangladesh Researchers

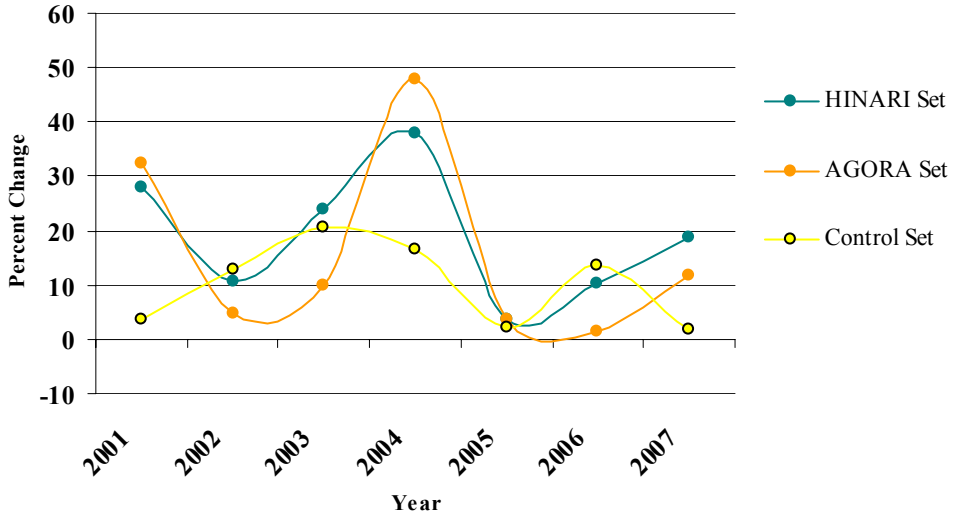


Figure C.176 Percent Change in Frequency of Citations Made by Bangladesh Researchers

Table C.88 Average Percent Change in Frequency of Citations Made by Bangladesh Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-0.5150	8.8561	0.3754	5.7451

C.3.4.3 Bhutan

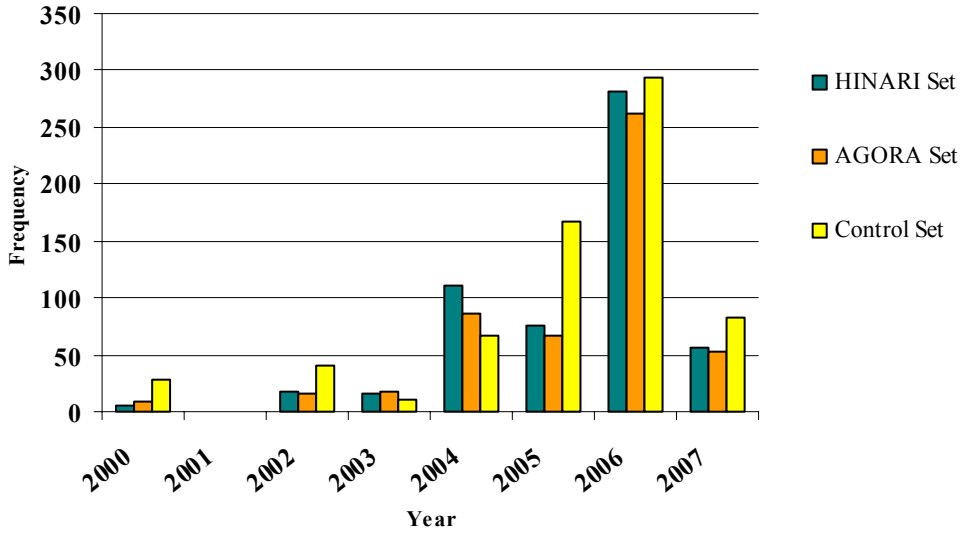


Figure C.177 Frequency of Citations Made by Bhutan Researchers

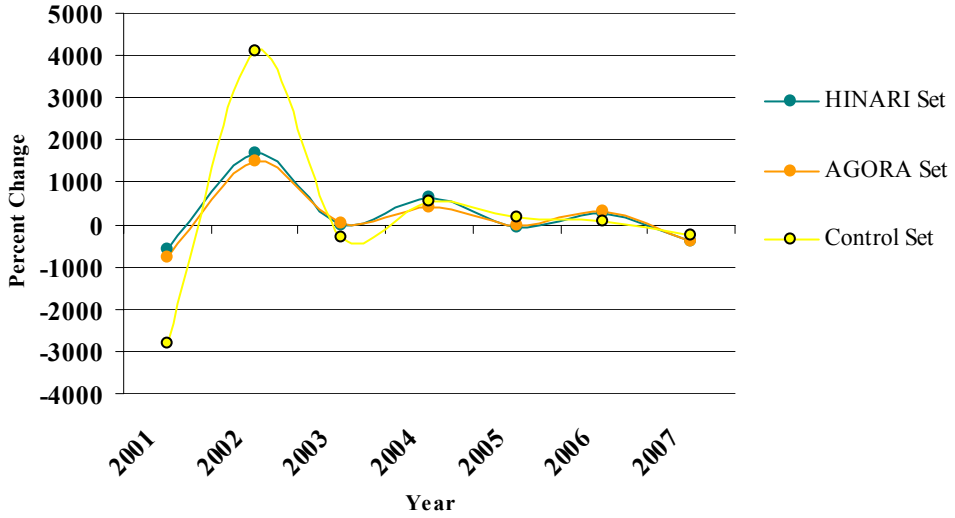


Figure C.178 Percent Change in Frequency of Citations Made by Bhutan Researchers

Table C.89 Average Percent Change in Frequency of Citations Made by Bhutan Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-459.6842	3.5448	-170.6021	-77.8184

C.3.4.4 Maldives

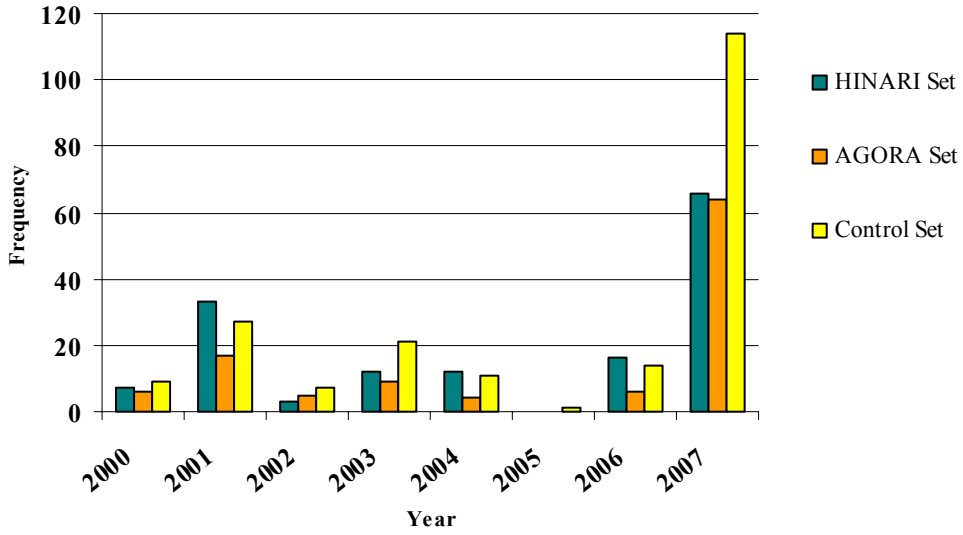


Figure C.179 Frequency of Citations Made by Maldives Researchers

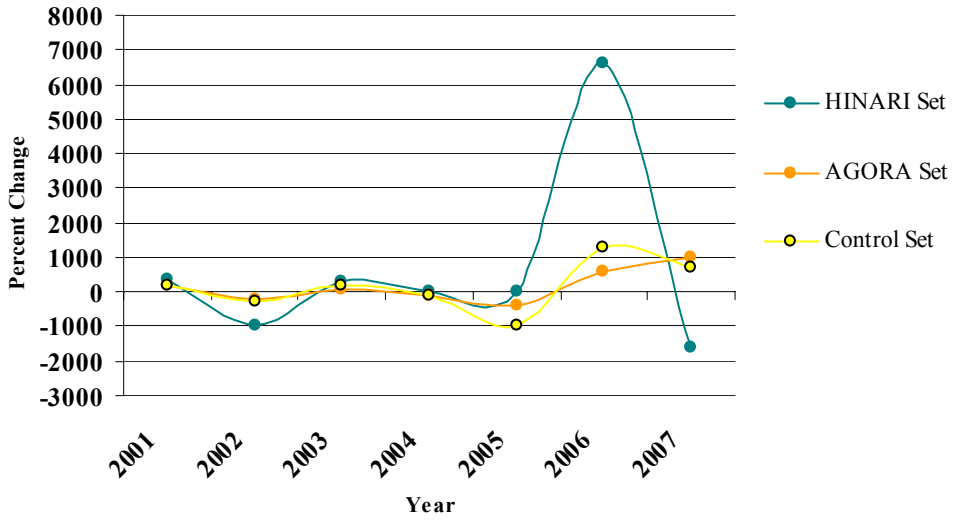


Figure C.180 Percent Change in Frequency of Citations Made by Maldives Researchers

Table C.90 Average Percent Change in Frequency of Citations Made by Maldives Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
1380.9524	523.8714	252.6389	3.9054

C.3.4.5 Nepal

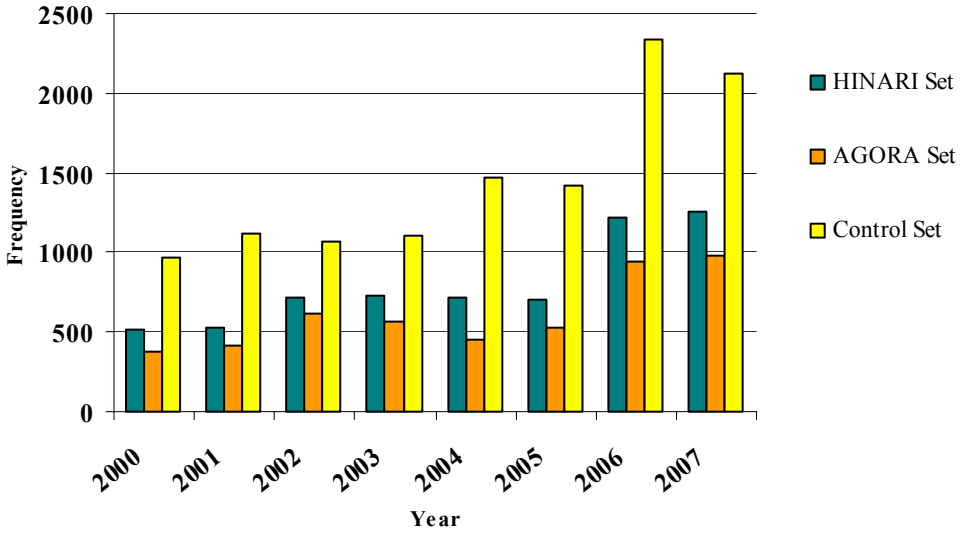


Figure C.181 Frequency of Citations Made by Nepal Researchers

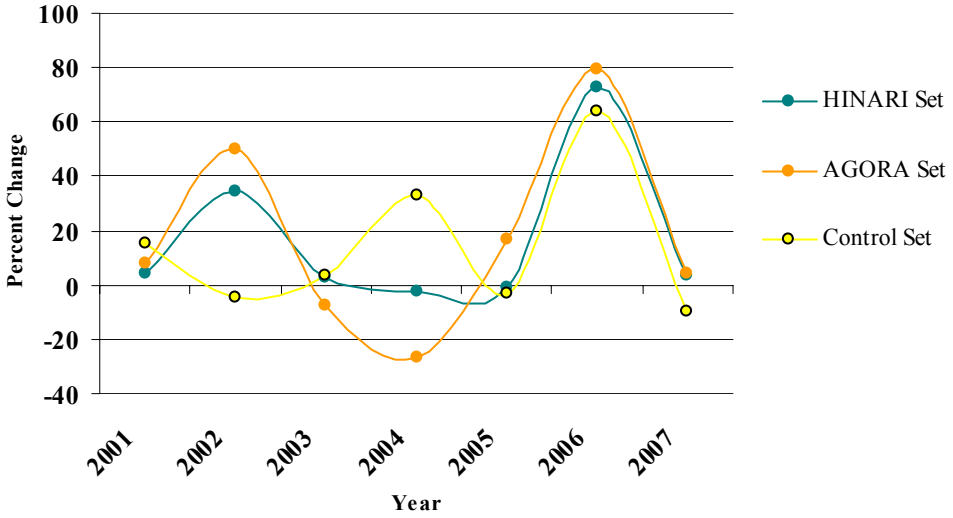


Figure C.182 Percent Change in Frequency of Citations Made by Nepal Researchers

Table C.91 Average Percent Change in Frequency of Citations Made by Nepal Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-4.0813	2.1745	1.8357	3.6043

C.3.5 Western Asia

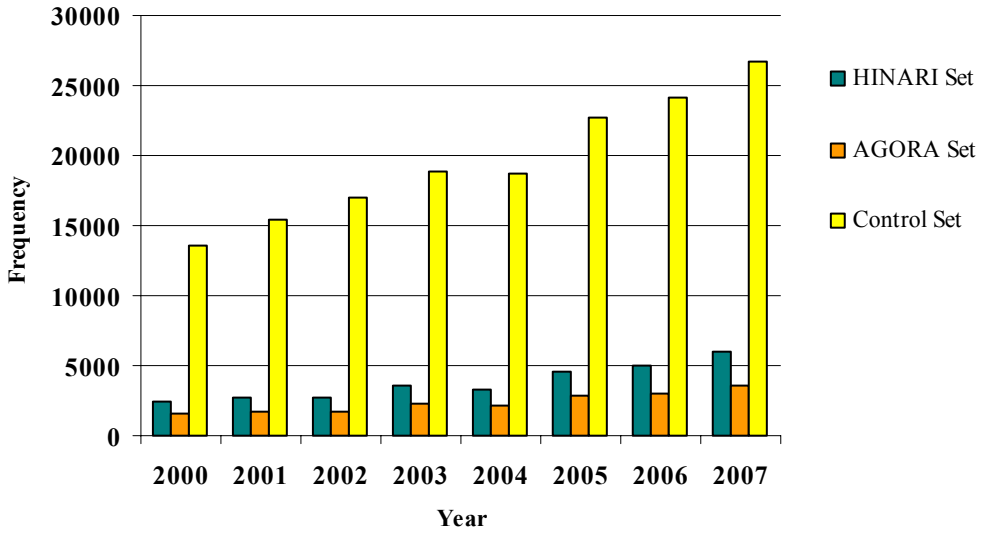


Figure C.183 Frequency of Citations Made by Eligible Western Asian Researchers

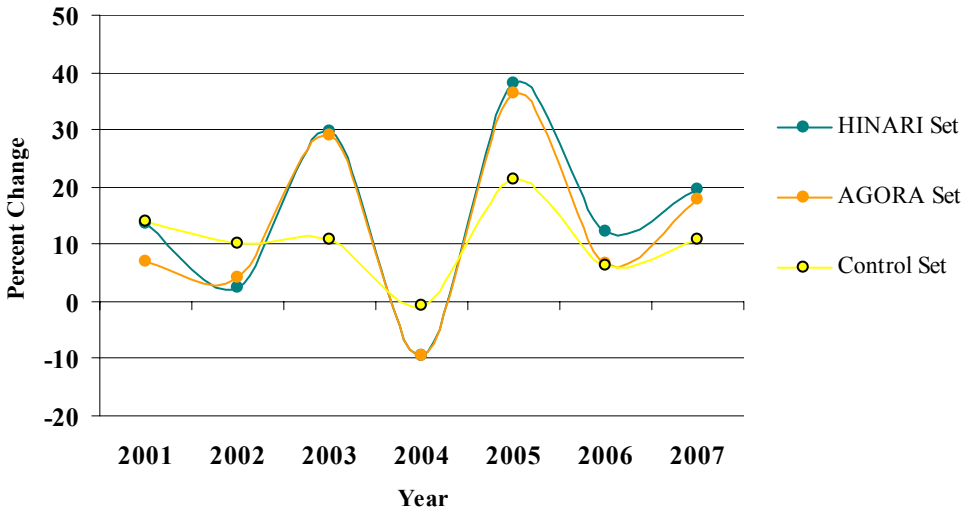


Figure C.184 Percent Change in Frequency of Citations Made by Eligible Western Asian Researchers

Table C.92 Average Percent Change in Frequency of Citations Made by Eligible Western Asian Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
9.9886	4.7160	-0.5589	2.7393

C.3.5.1 Armenia

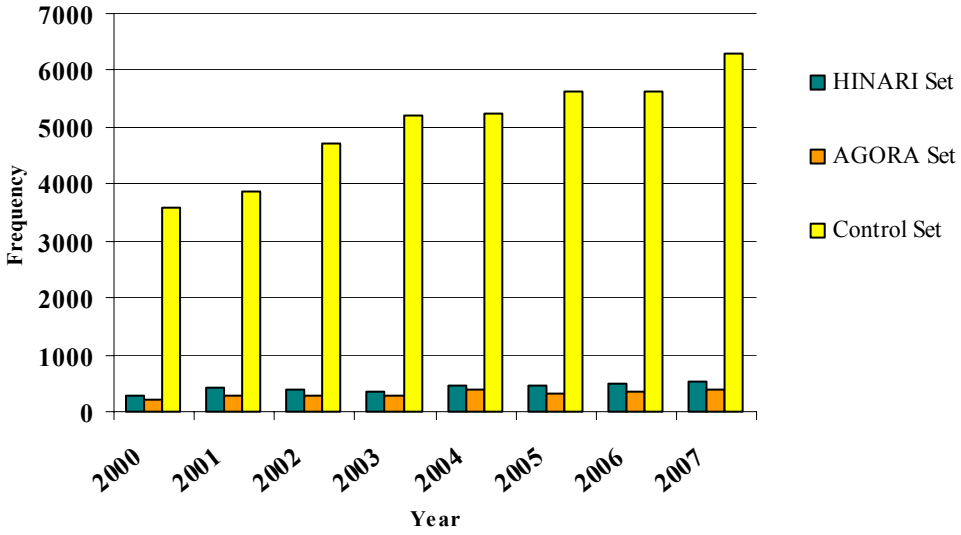


Figure C.185 Frequency of Citations Made by Armenia Researchers

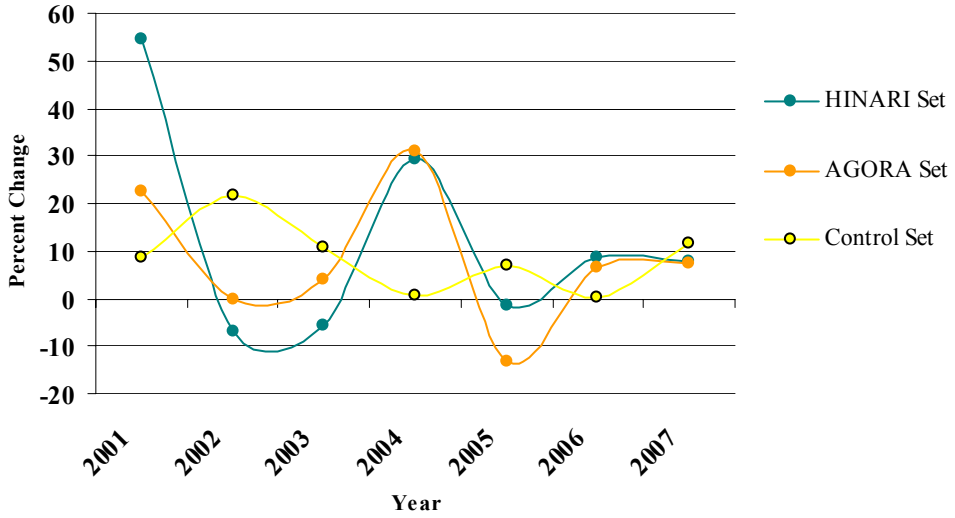


Figure C.186 Percent Change in Frequency of Citations Made by Armenia Researchers

Table C.93 Average Percent Change in Frequency of Citations Made by Armenia Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-16.2461	3.6598	-1.0441	-0.3465

C.3.5.2 Azerbaijan

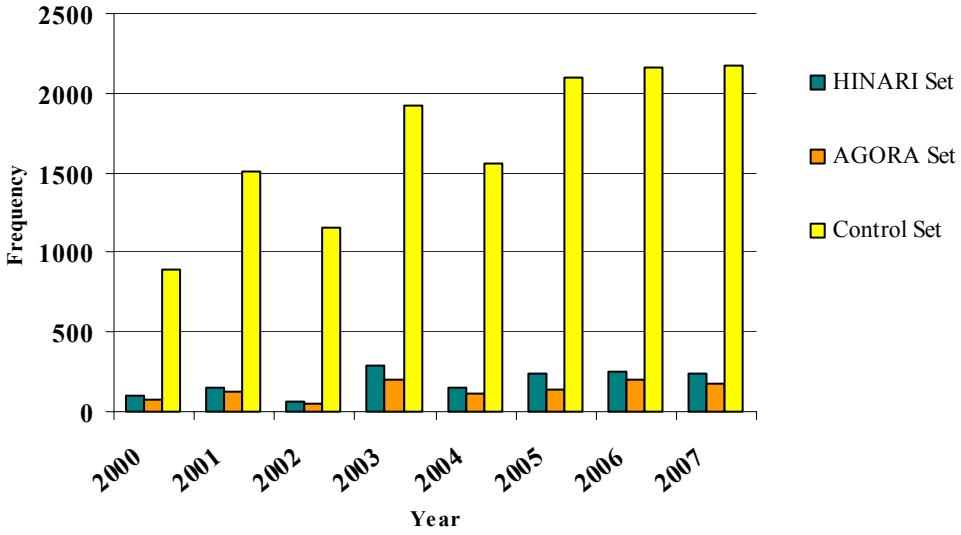


Figure C.187 Frequency of Citations Made by Azerbaijan Researchers

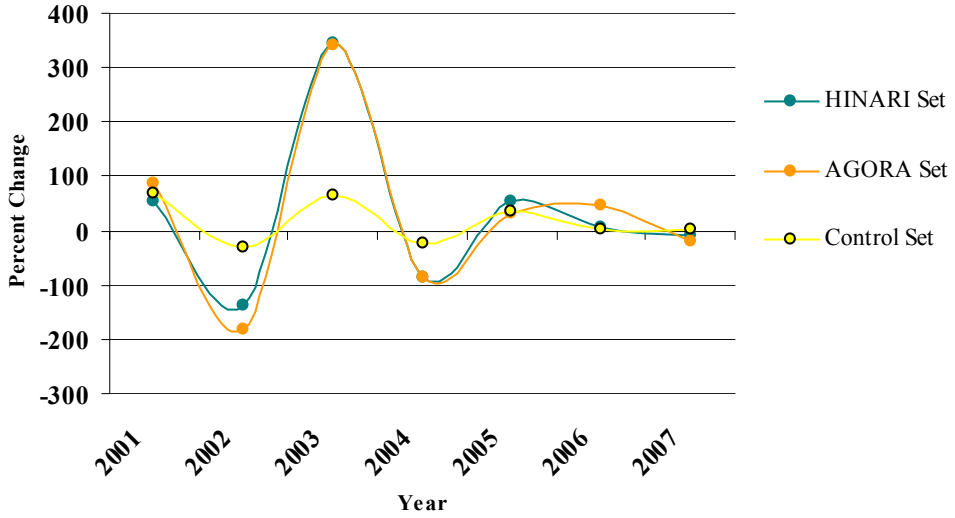


Figure C.188 Percent Change in Frequency of Citations Made by Azerbaijan Researchers

Table C.94 Average Percent Change in Frequency of Citations Made by Azerbaijan Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
102.3594	14.9023	-89.1044	13.2957

C.3.5.3 Georgia

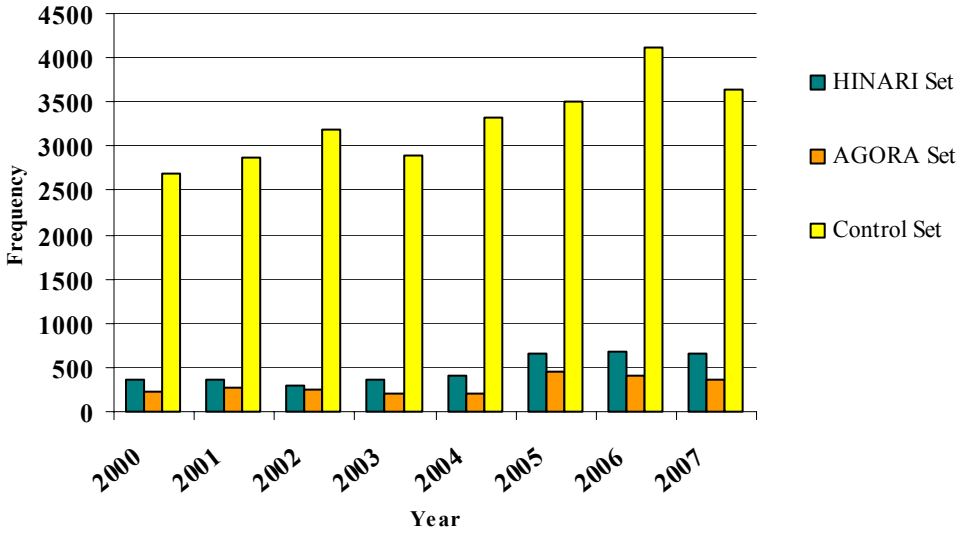


Figure C.189 Frequency of Citations Made by Georgia Researchers

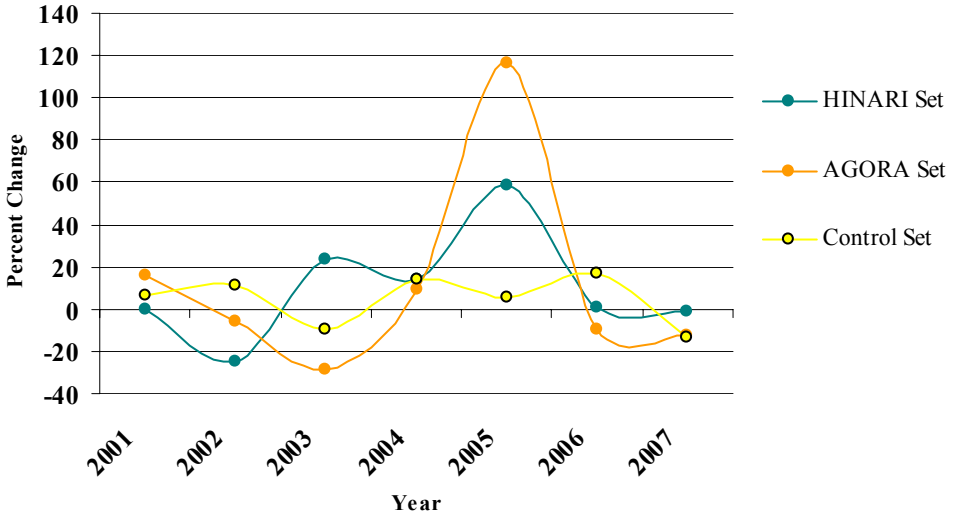


Figure C.190 Percent Change in Frequency of Citations Made by Georgia Researchers

Table C.95 Average Percent Change in Frequency of Citations Made by Georgia Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
31.7297	5.5358	32.1332	7.6048

C.3.5.4 Iraq

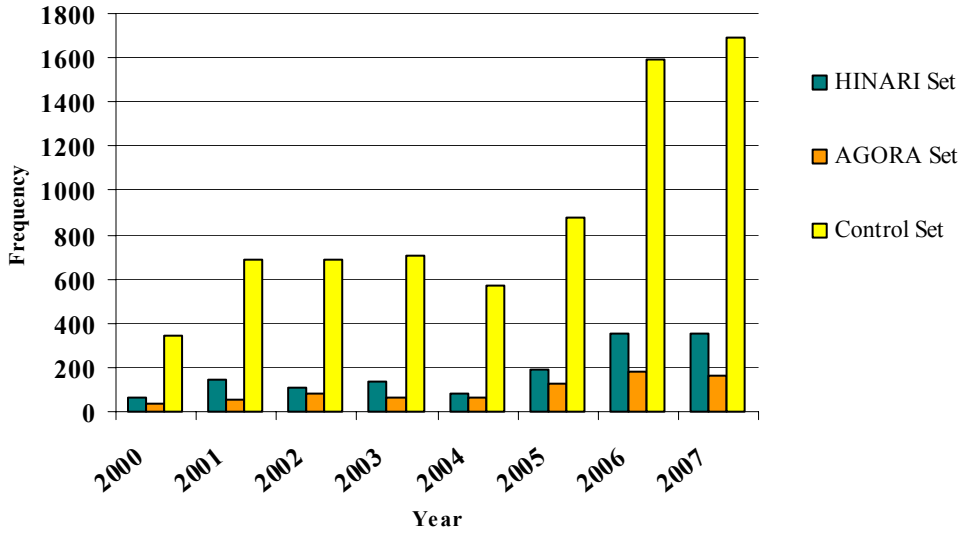


Figure C.191 Frequency of Citations Made by Iraq Researchers

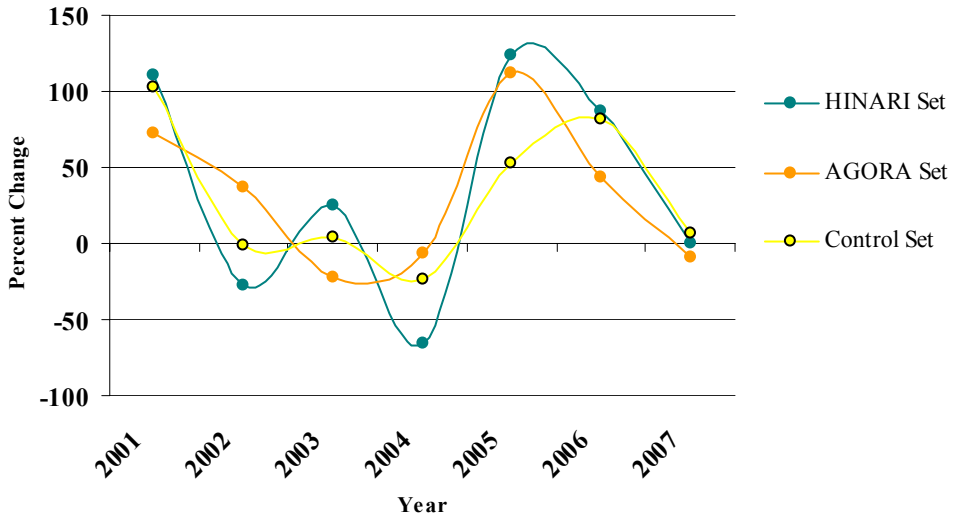


Figure C.192 Percent Change in Frequency of Citations Made by Iraq Researchers

Table C.96 Average Percent Change in Frequency of Citations Made by Iraq Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-7.6012	4.5272	5.5998	0.6776

C.3.5.5 Jordan

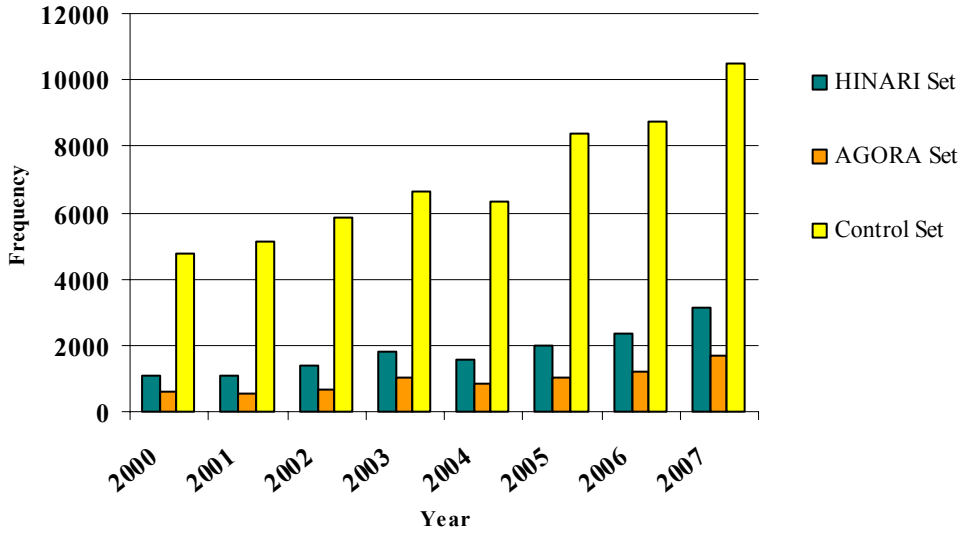


Figure C.193 Frequency of Citations Made by Jordan Researchers

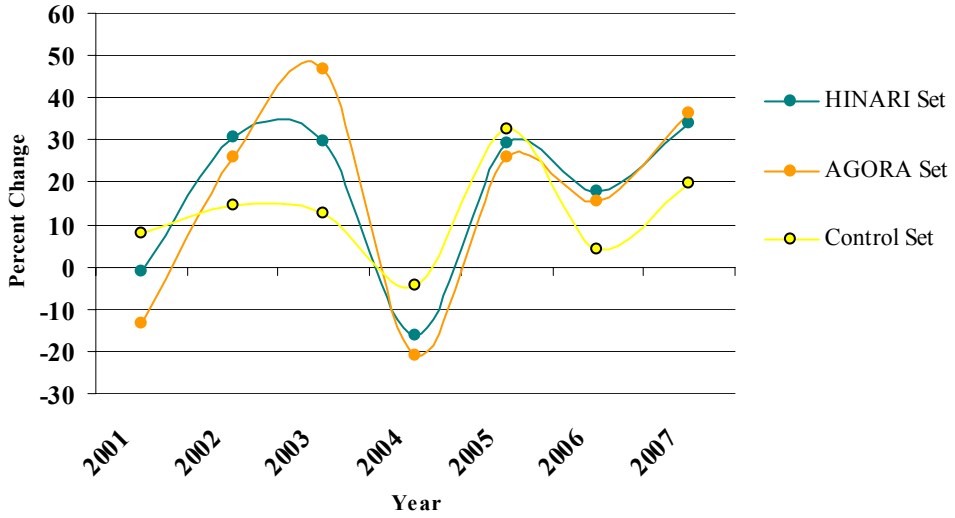


Figure C.194 Percent Change in Frequency of Citations Made by Jordan Researchers

Table C.97 Average Percent Change in Frequency of Citations Made by Jordan Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
4.1915	5.2028	-5.6753	4.2659

C.3.5.6 Syria

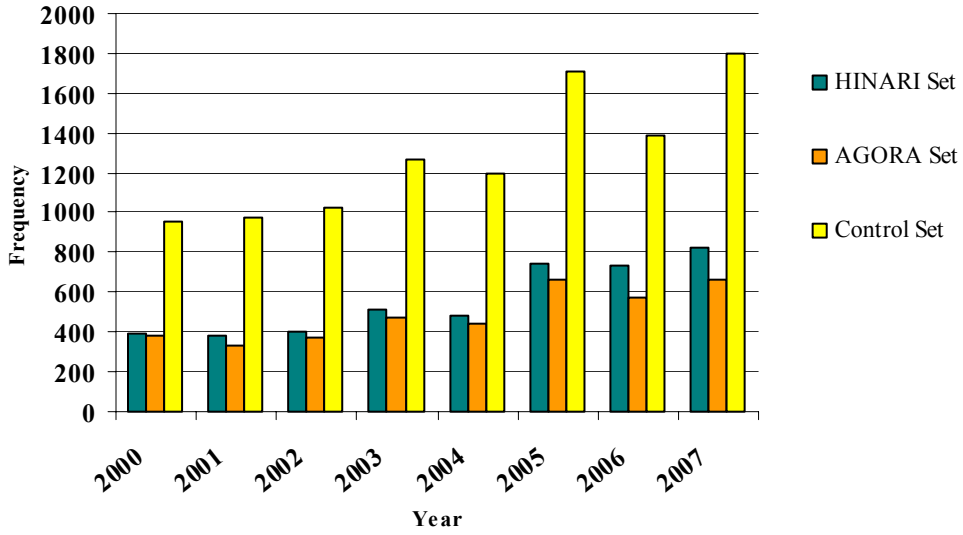


Figure C.195 Frequency of Citations Made by Syria Researchers

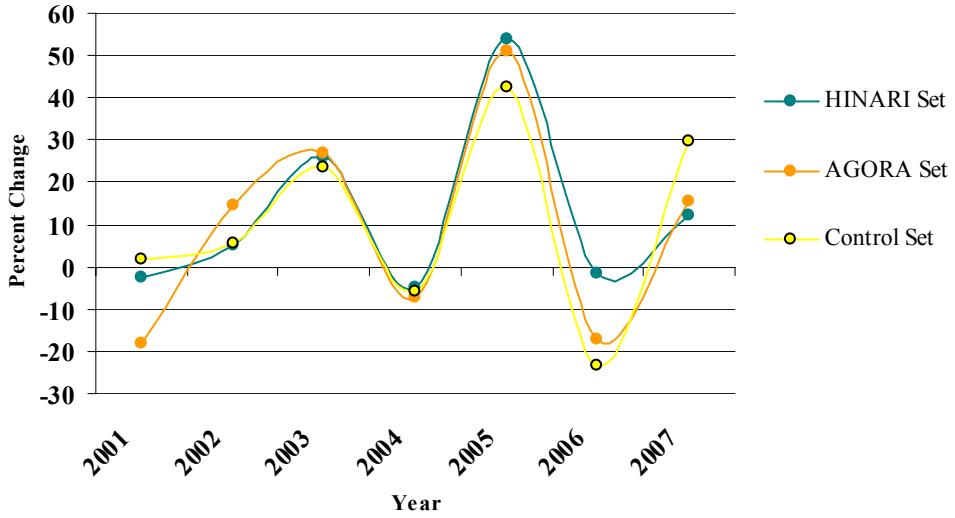


Figure C.196 Percent Change in Frequency of Citations Made by Syria Researchers

Table C.98 Average Percent Change in Frequency of Citations Made by Syria Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
15.8816	1.9162	2.7547	-1.2519

C.3.5.7 West Bank – Gaza

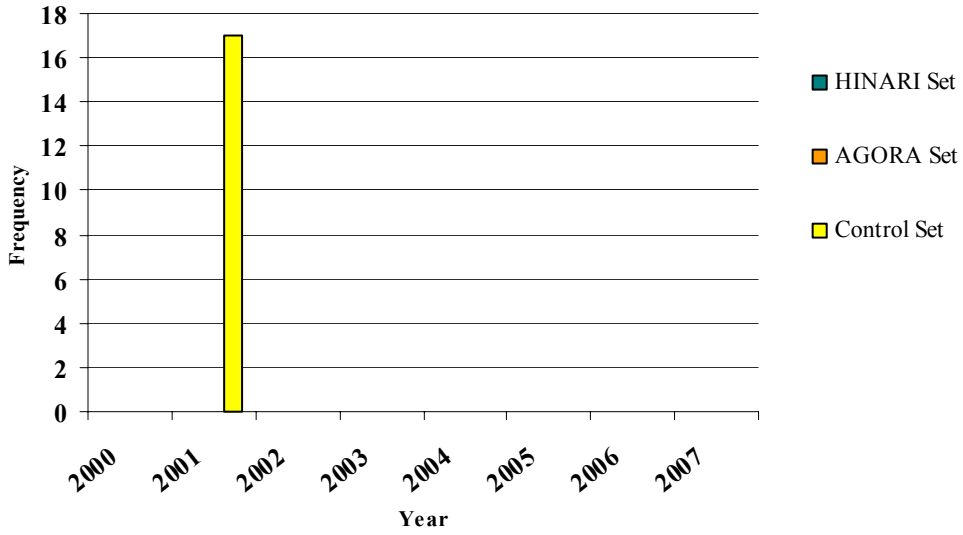


Figure C.197 Frequency of Citations Made by West Bank – Gaza Researchers

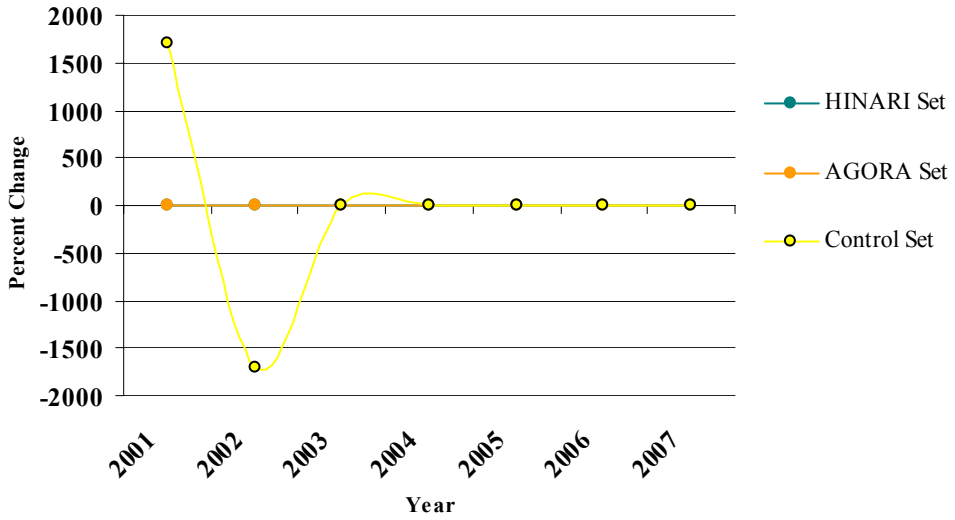


Figure C.198 Percent Change in Frequency of Citations Made by West Bank – Gaza Researchers

Table C.99 Average Percent Change in Frequency of Citations Made by West Bank – Gaza Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
0.0000	0.0000	0.0000	0.0000

C.3.5.8 Yemen

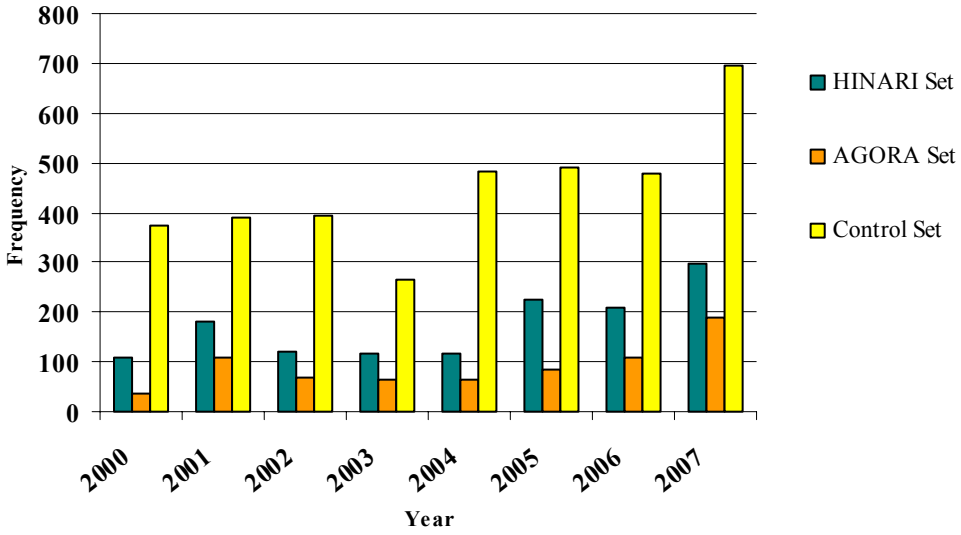


Figure C.199 Frequency of Citations Made by Yemen Researchers

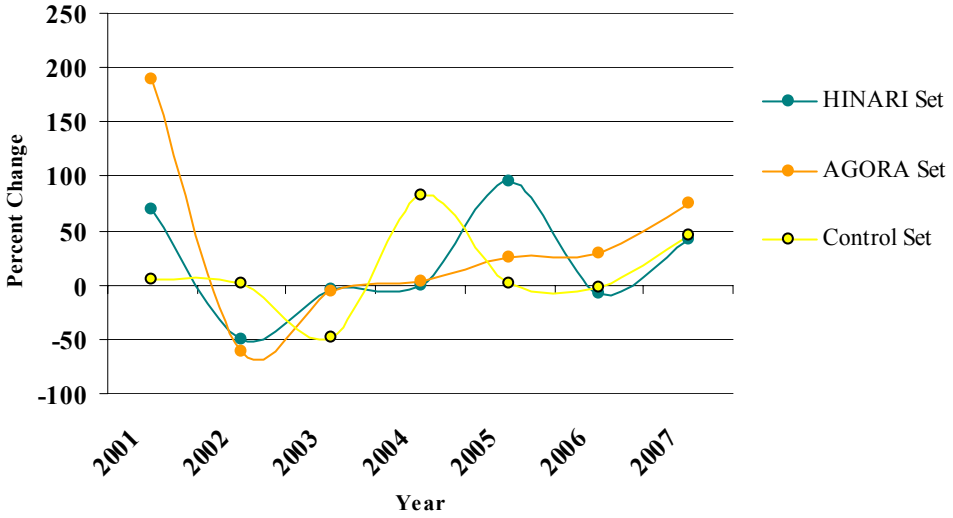


Figure C.200 Percent Change in Frequency of Citations Made by Yemen Researchers

Table C.100 Average Percent Change in Frequency of Citations Made by Yemen Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
15.1533	8.7910	-7.1115	24.5497

C.4 Europe

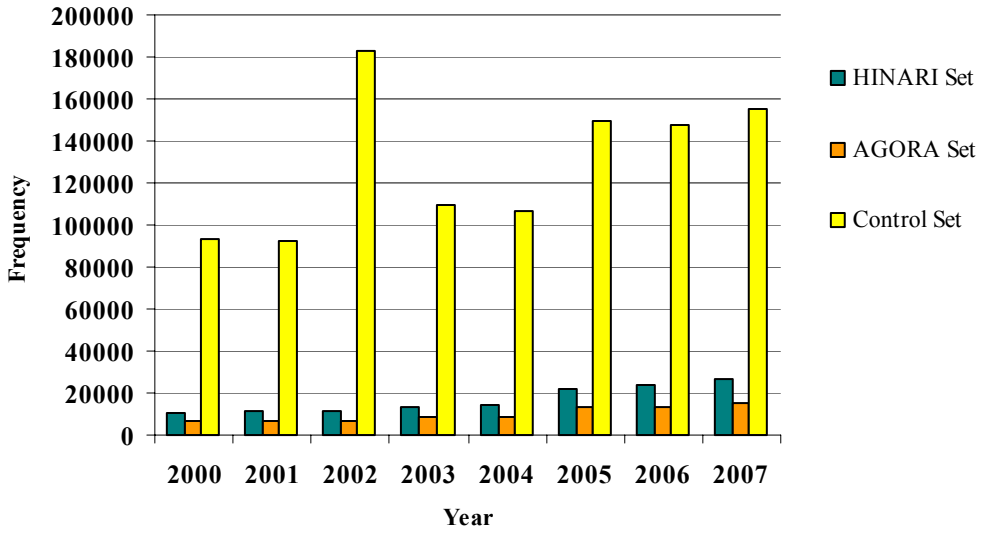


Figure C.201 Frequency of Citations Made by Eligible European Researchers

Figure C.202 Percent Change in Frequency of Citations Made by Eligible European Researchers

Table C.101 Average Percent Change in Frequency of Citations Made by Eligible European Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
16.6753	5.0774	7.0154	3.8029

C.4.1 Eastern Europe

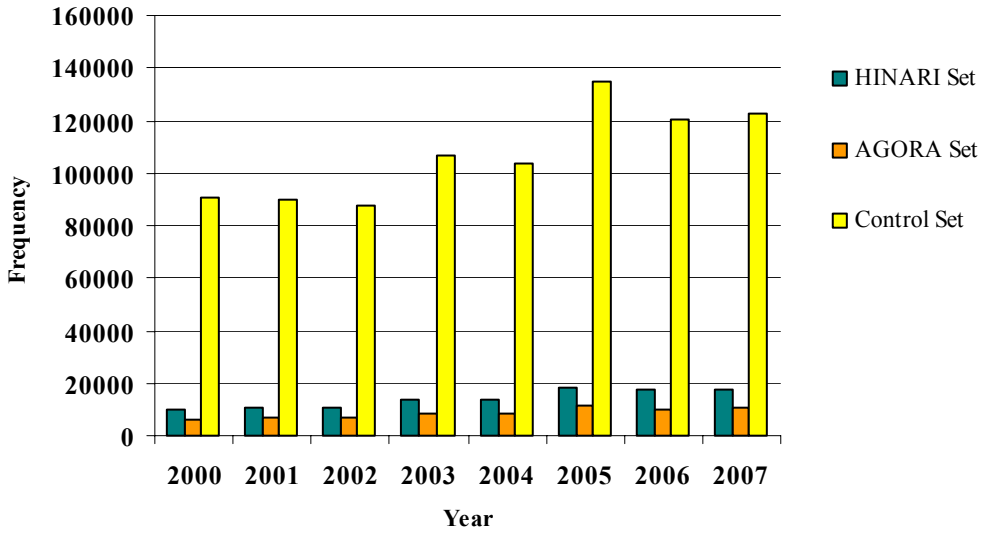


Figure C.203 Frequency of Citations Made by Eligible Eastern European Researchers

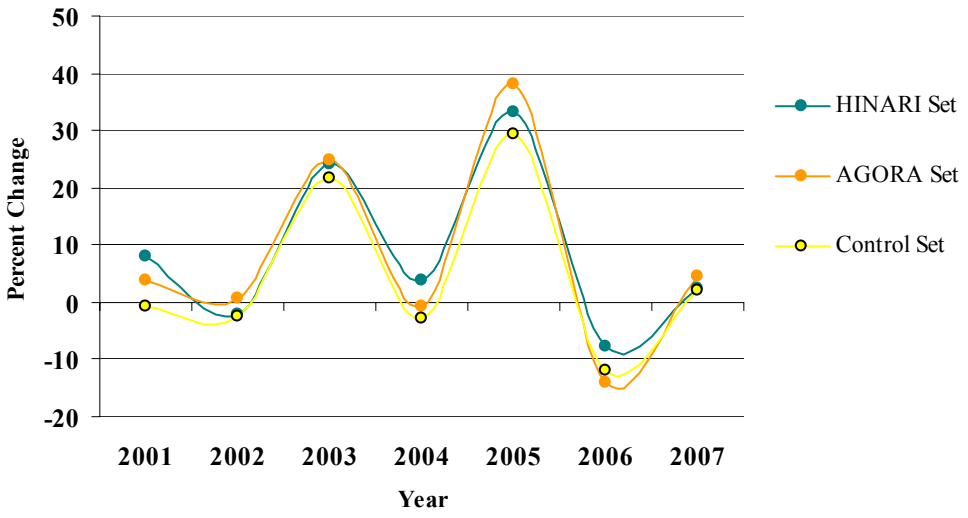


Figure C.204 Percent Change in Frequency of Citations Made by Eligible Eastern European Researchers

Table C.102 Average Percent Change in Frequency of Citations Made by Eligible Eastern European Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
8.2033	3.8282	-2.7550	3.1870

C.4.1.1 Belarus

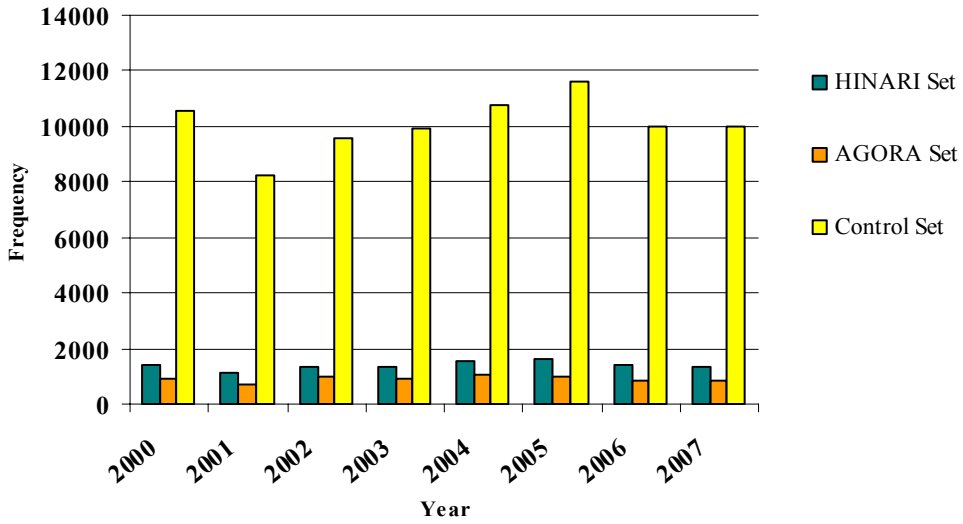


Figure C.205 Frequency of Citations Made by Belarus Researchers

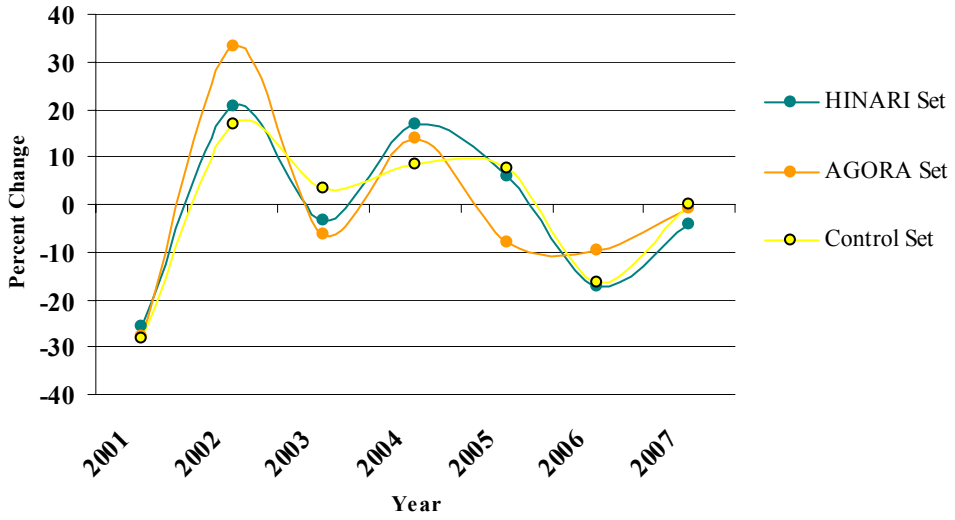


Figure C.206 Percent Change in Frequency of Citations Made by Belarus Researchers

Table C.103 Average Percent Change in Frequency of Citations Made by Belarus Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
2.1220	0.1269	-0.9023	0.3106

C.4.1.2 Bulgaria

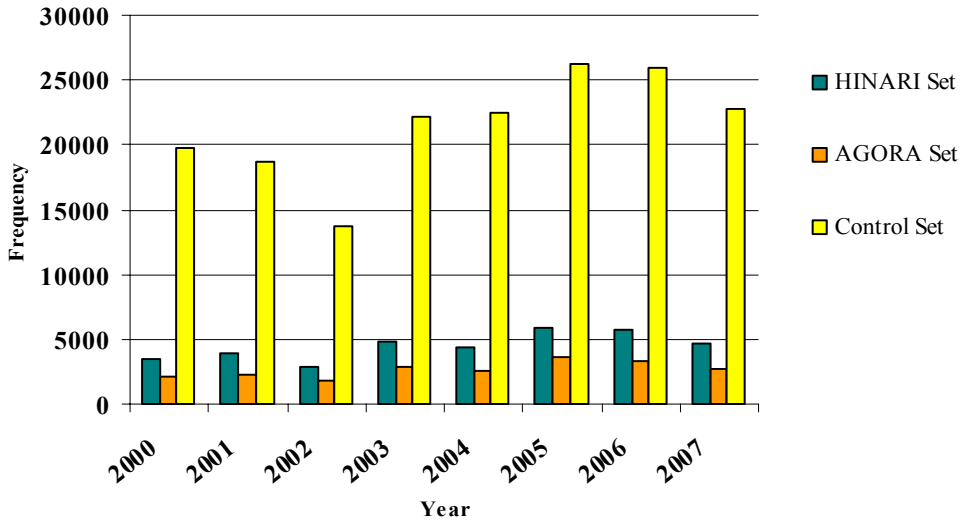


Figure C.207 Frequency of Citations Made by Bulgaria Researchers

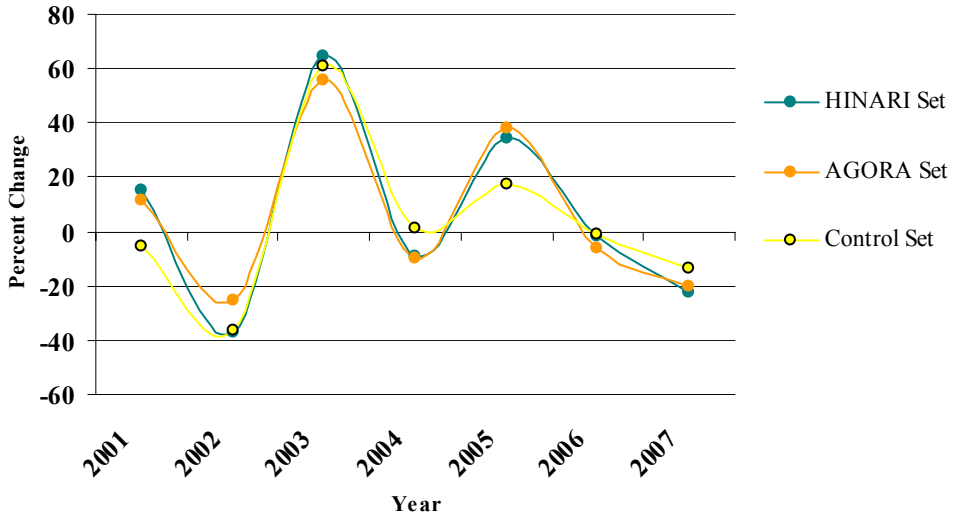


Figure C.208 Percent Change in Frequency of Citations Made by Bulgaria Researchers

Table C.104 Average Percent Change in Frequency of Citations Made by Bulgaria Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
23.8292	3.0817	-13.4205	3.0287

C.4.1.3 Moldova

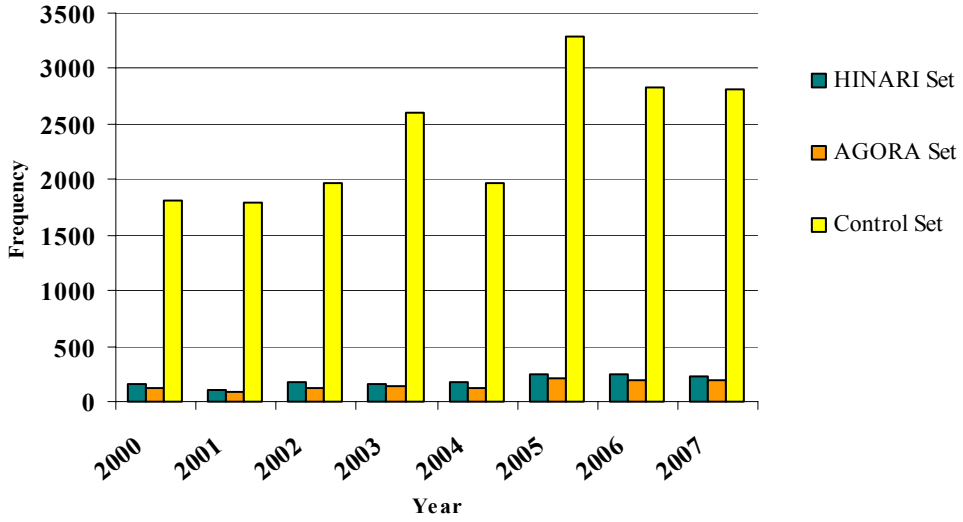


Figure C.209 Frequency of Citations Made by Moldova Researchers

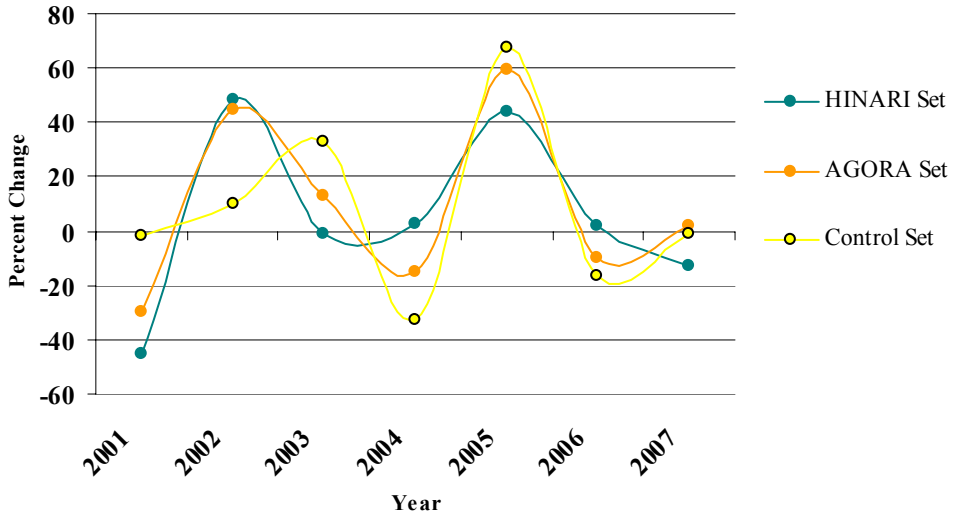


Figure C.210 Percent Change in Frequency of Citations Made by Moldova Researchers

Table C.105 Average Percent Change in Frequency of Citations Made by Moldova Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
5.6946	-2.9662	-0.0571	0.7915

C.4.1.4 Romania

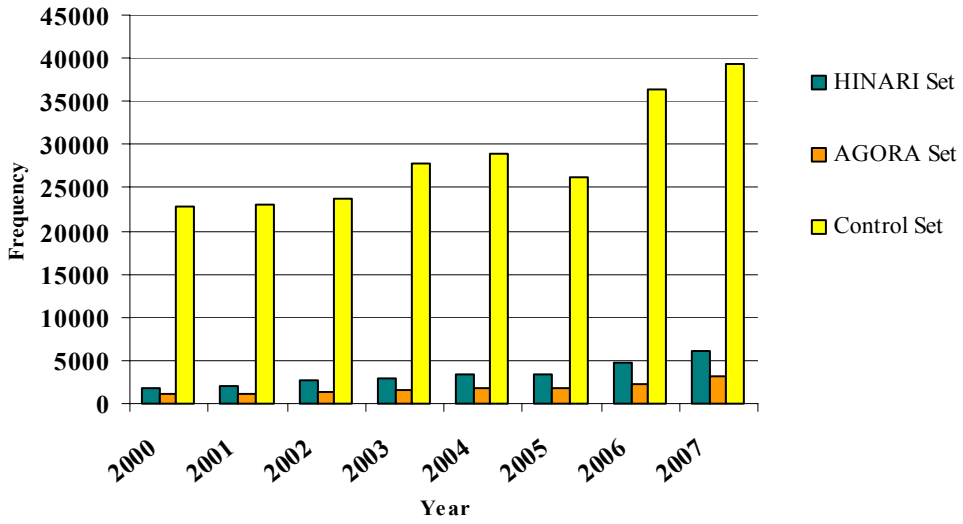


Figure C.211 Frequency of Citations Made by Romania Researchers

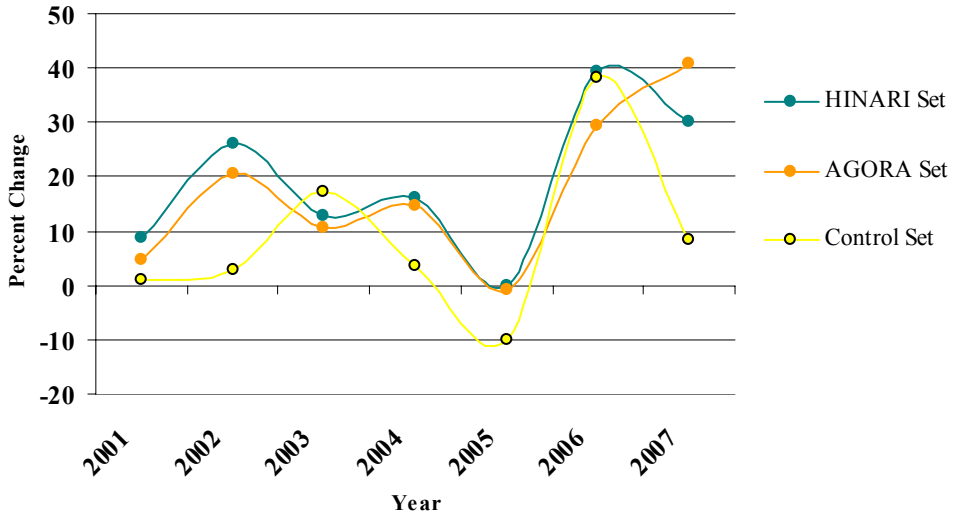


Figure C.212 Percent Change in Frequency of Citations Made by Romania Researchers

Table C.106 Average Percent Change in Frequency of Citations Made by Romania Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
2.1826	10.3248	9.0706	8.3771

C.4.1.5 Ukraine

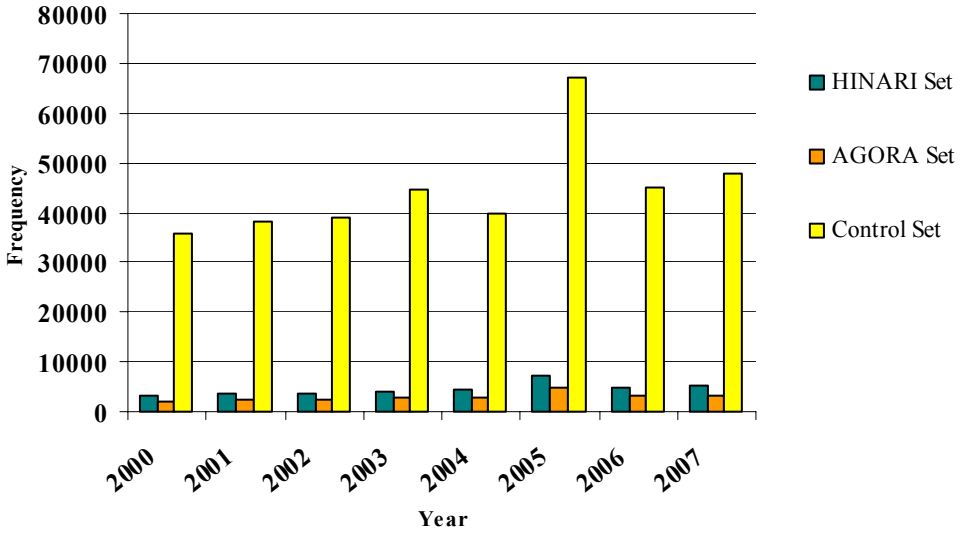


Figure C.213 Frequency of Citations Made by Ukraine Researchers

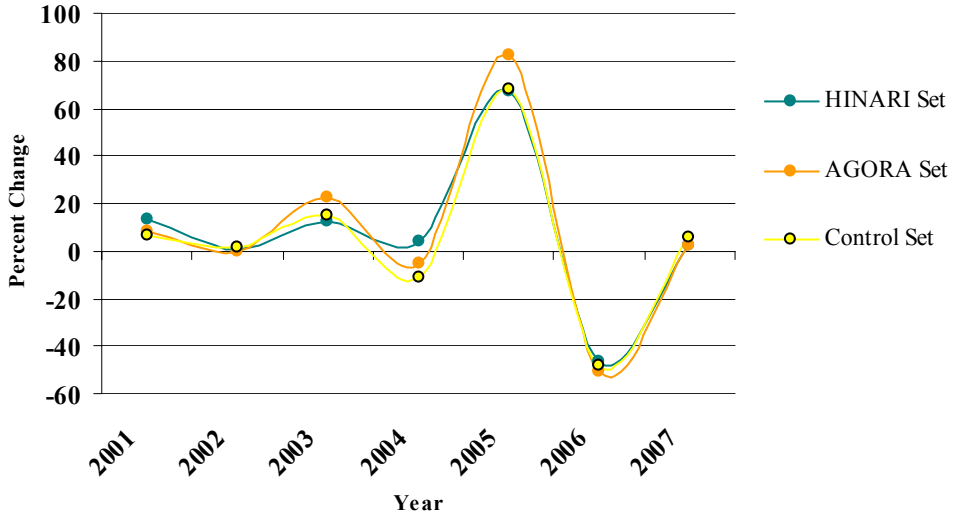


Figure C.214 Percent Change in Frequency of Citations Made by Ukraine Researchers

Table C.107 Average Percent Change in Frequency of Citations Made by Ukraine Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
0.6412	2.4271	-3.1490	3.2011

C.4.2 Southern Europe

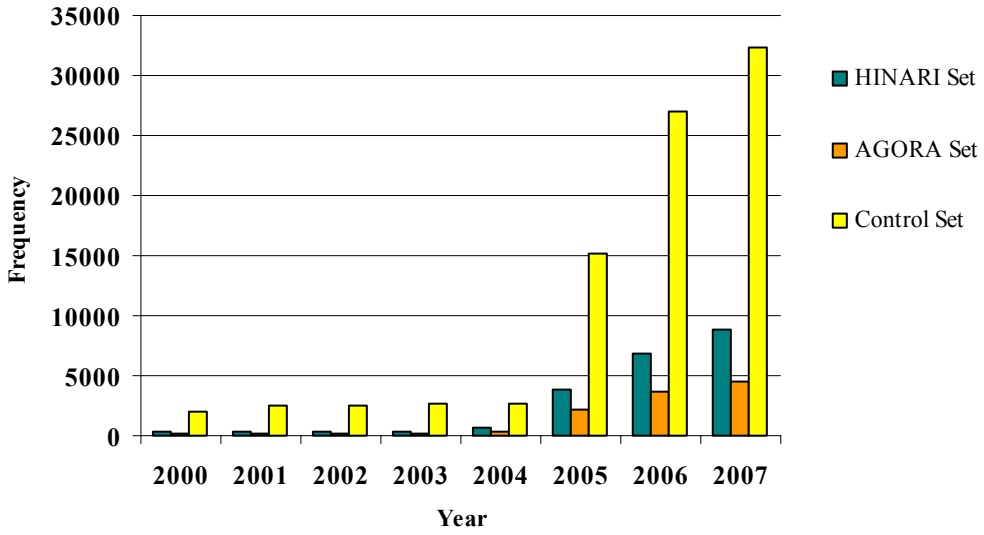


Figure C.215 Frequency of Citations Made by Eligible Southern European Researchers

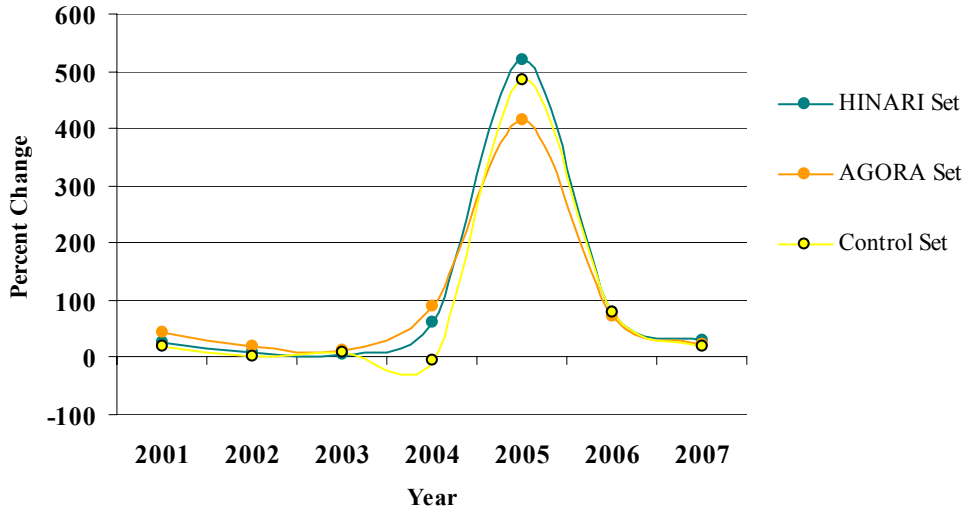


Figure C.216 Percent Change in Frequency of Citations Made by Eligible Southern European Researchers

Table C.108 Average Percent Change in Frequency of Citations Made by Eligible Southern European Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
120.5370	17.8665	124.9318	9.4206

C.4.3.1 Albania

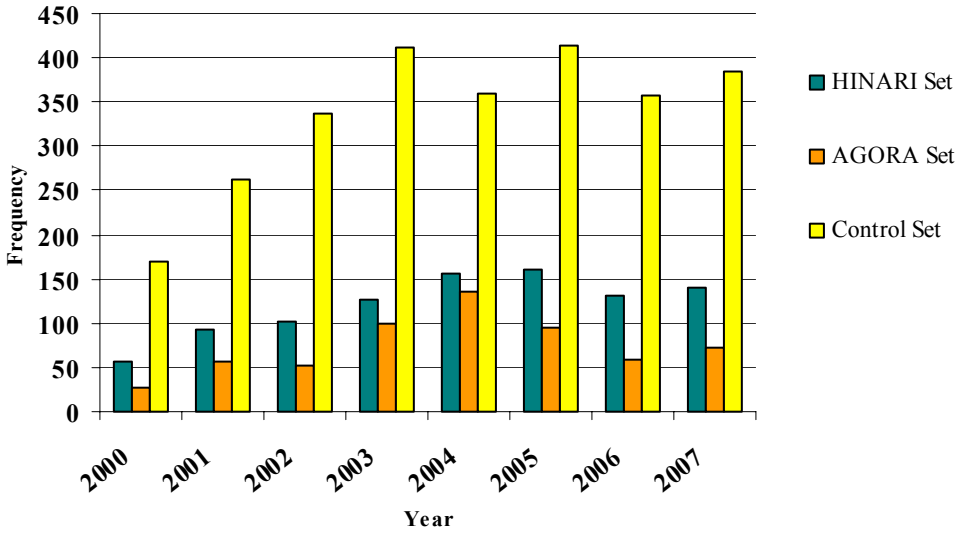


Figure C.217 Frequency of Citations Made by Albania Researchers

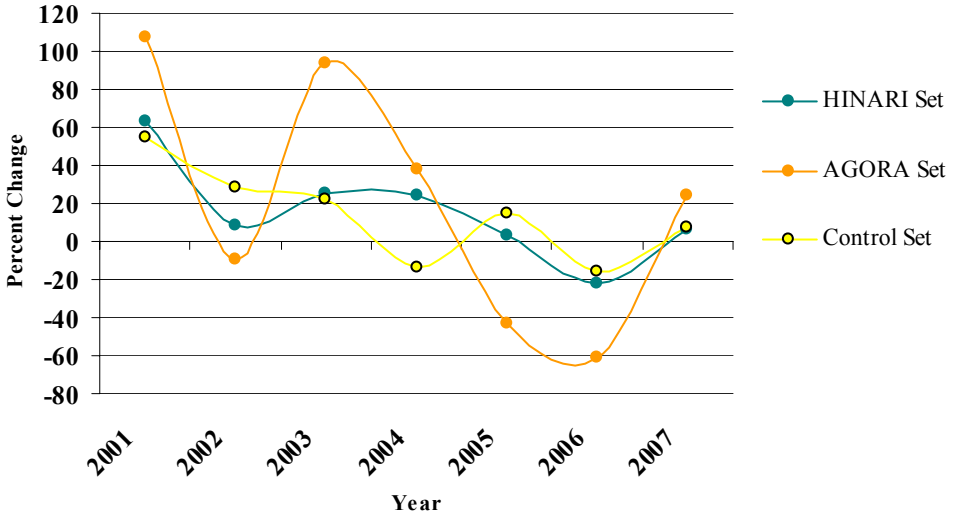


Figure C.218 Percent Change in Frequency of Citations Made by Albania Researchers

Table C.109 Average Percent Change in Frequency of Citations Made by Albania Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-28.5569	1.5489	-74.6751	7.3023

C.4.3.2 Bosnia Herzegovina

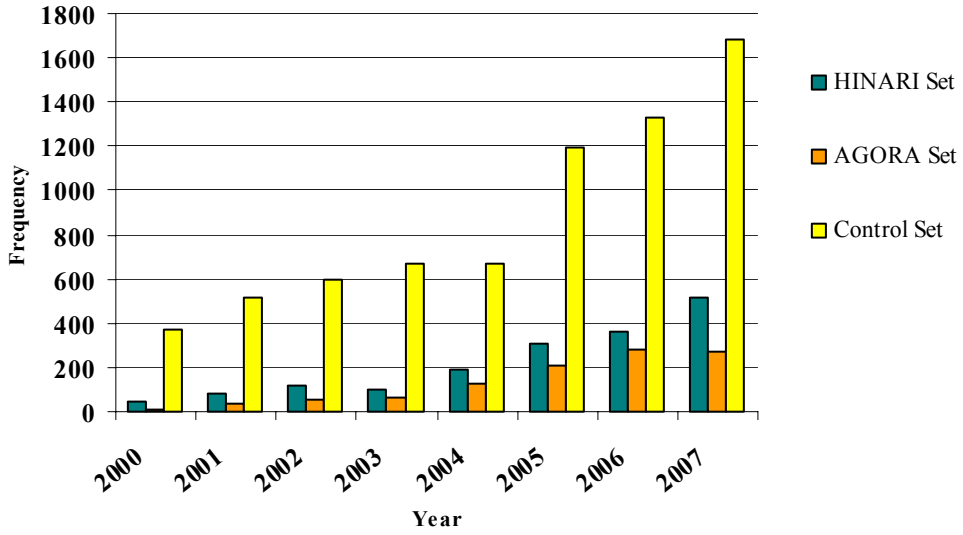


Figure C.219 Frequency of Citations Made by Bosnia Herzegovina Researchers

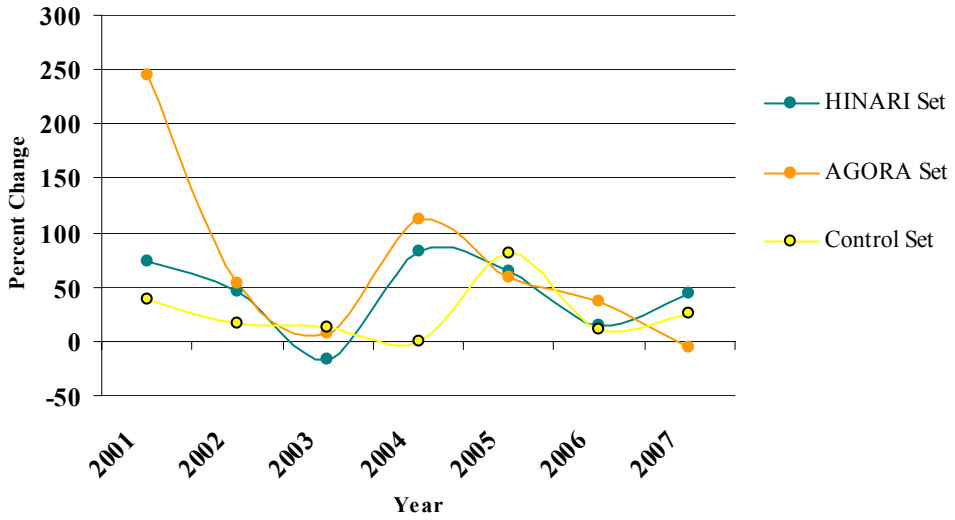


Figure C.220 Percent Change in Frequency of Citations Made by Bosnia Herzegovina Researchers

Table C.110 Average Percent Change in Frequency of Citations Made by Bosnia Herzegovina Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-21.5349	17.6463	-51.4303	45.9507

C.4.3.3 Macedonia

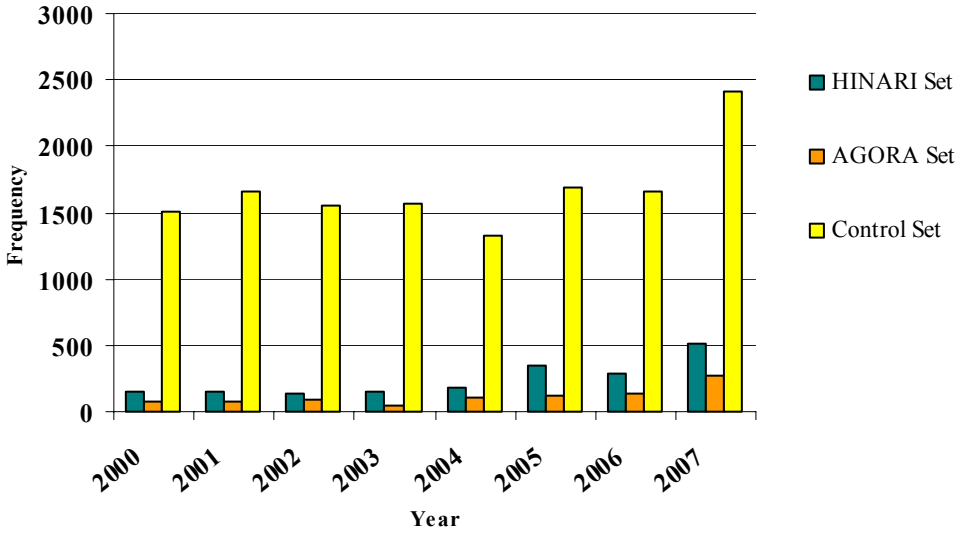


Figure C.221 Frequency of Citations Made by Macedonia Researchers

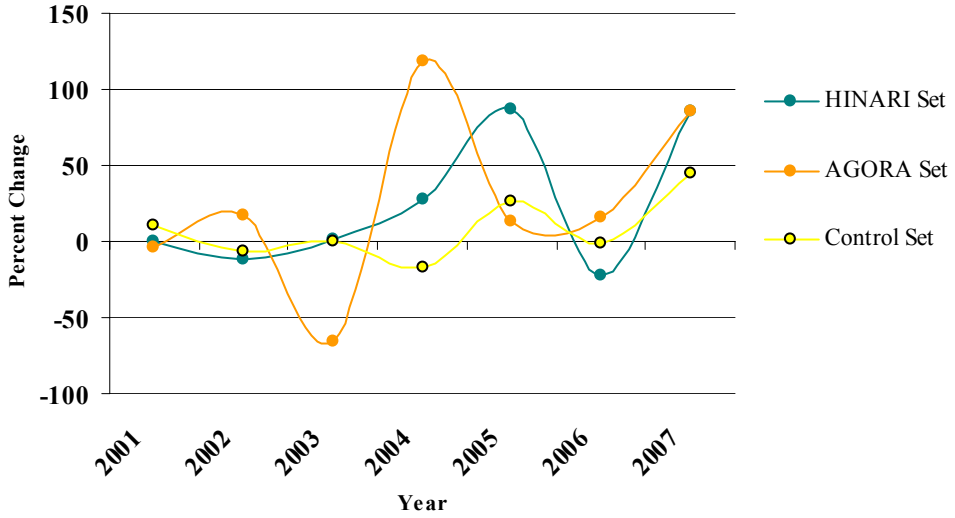


Figure C.222 Percent Change in Frequency of Citations Made by Macedonia Researchers

Table C.111 Average Percent Change in Frequency of Citations Made by Macedonia Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
41.2537	15.8076	76.0492	17.6566

C.4.3.4 Montenegro

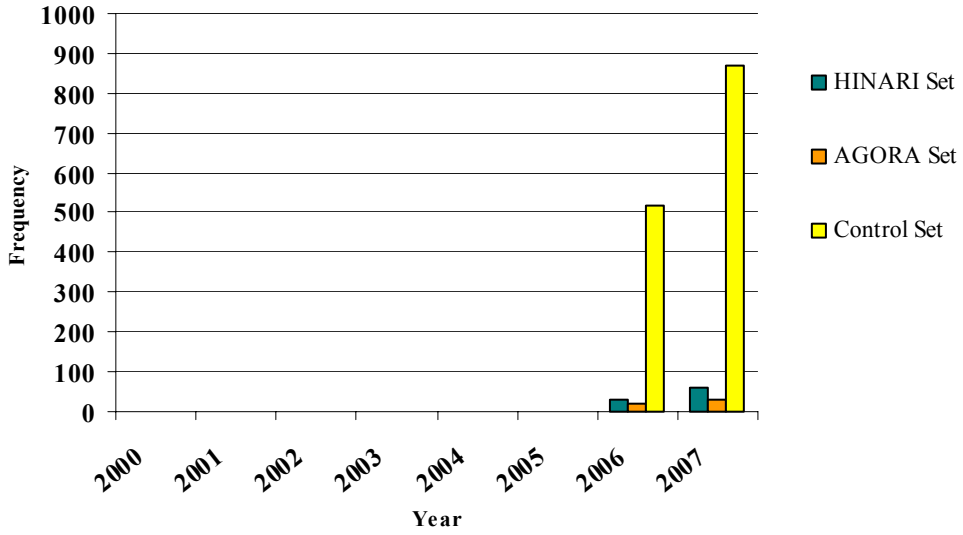


Figure C.223 Frequency of Citations Made by Montenegro Researchers

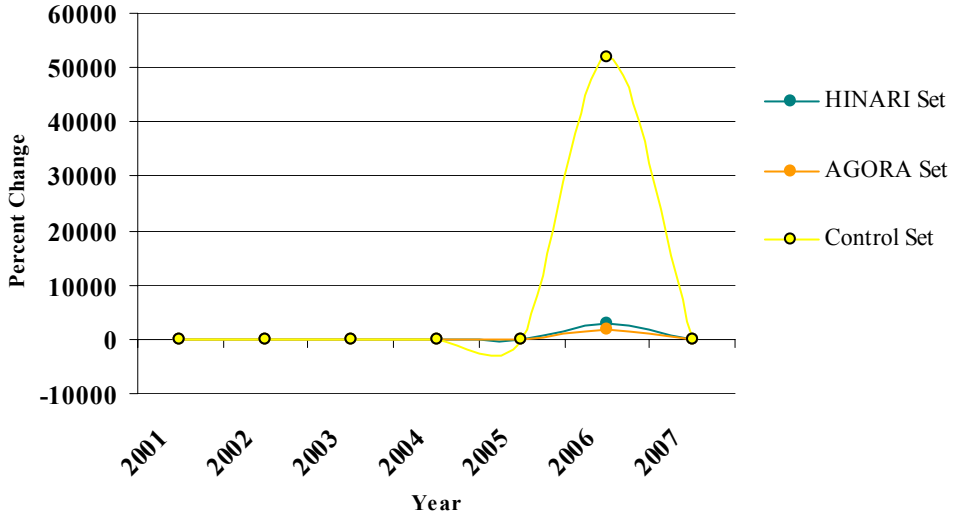


Figure C.224 Percent Change in Frequency of Citations Made by Montenegro Researchers

Table C.112 Average Percent Change in Frequency of Citations Made by Montenegro Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
600.6897	-6994.8281	469.4444	-7155.6381

C.4.3.5 Serbia

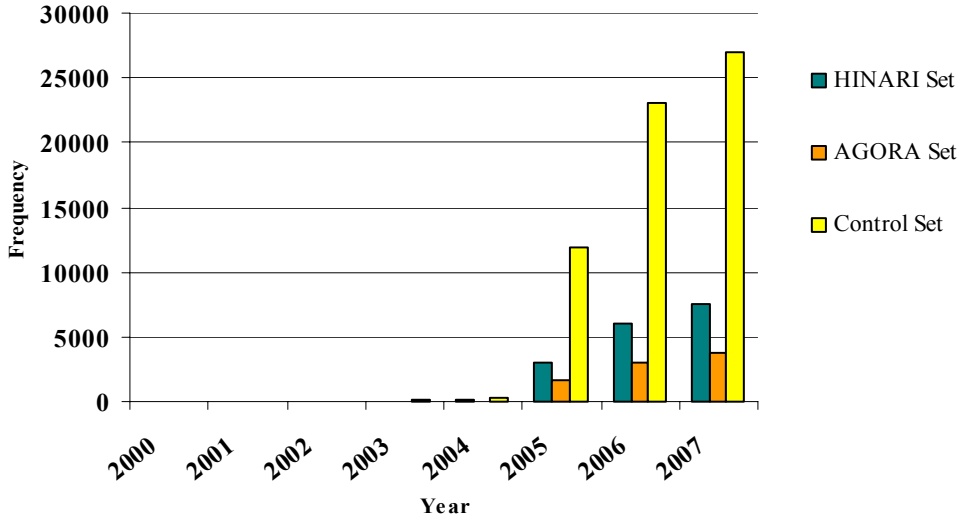


Figure C.225 Frequency of Citations Made by Serbia Researchers

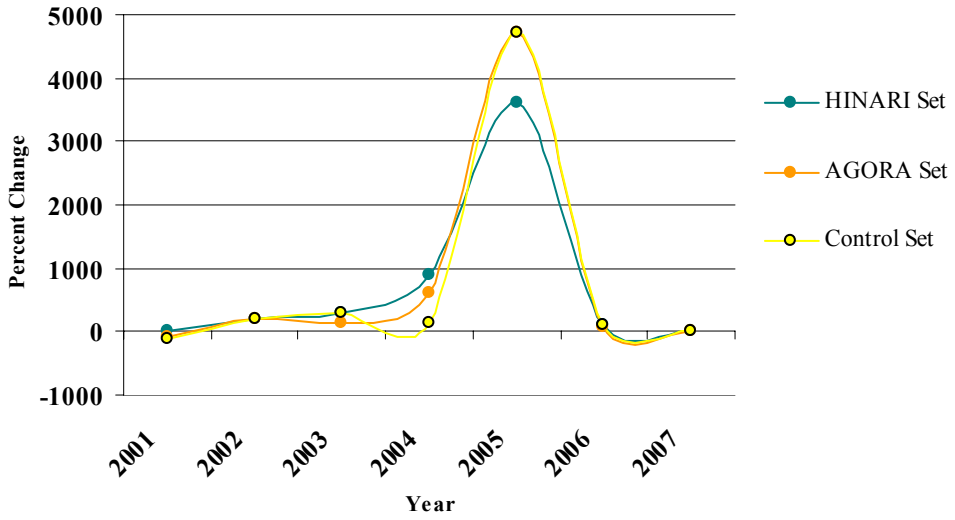


Figure C.226 Percent Change in Frequency of Citations Made by Serbia Researchers

Table C.113 Average Percent Change in Frequency of Citations Made by Serbia Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
888.8483	-27.5313	1271.2139	47.3183

C.5 Oceana

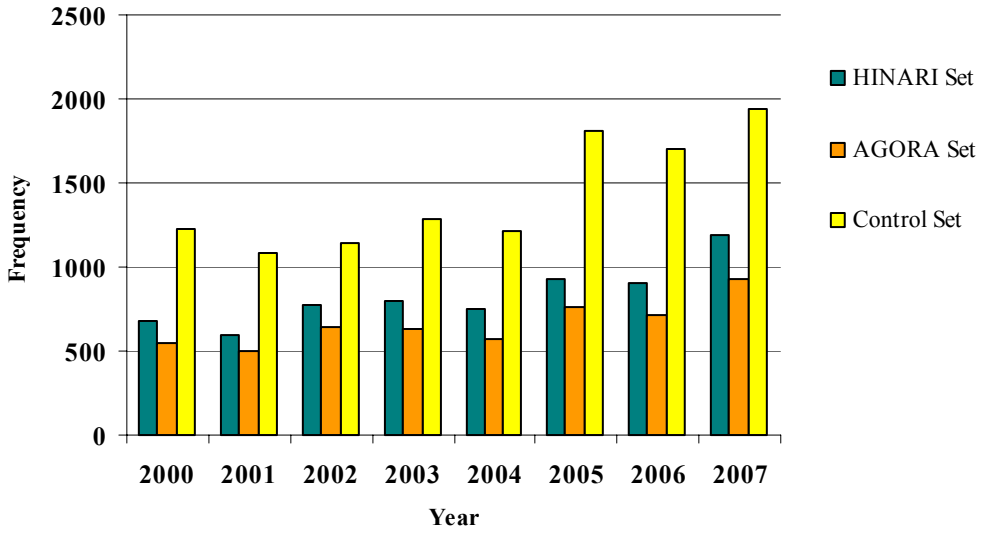


Figure C.227 Frequency of Citations Made by Eligible Oceanic Researchers

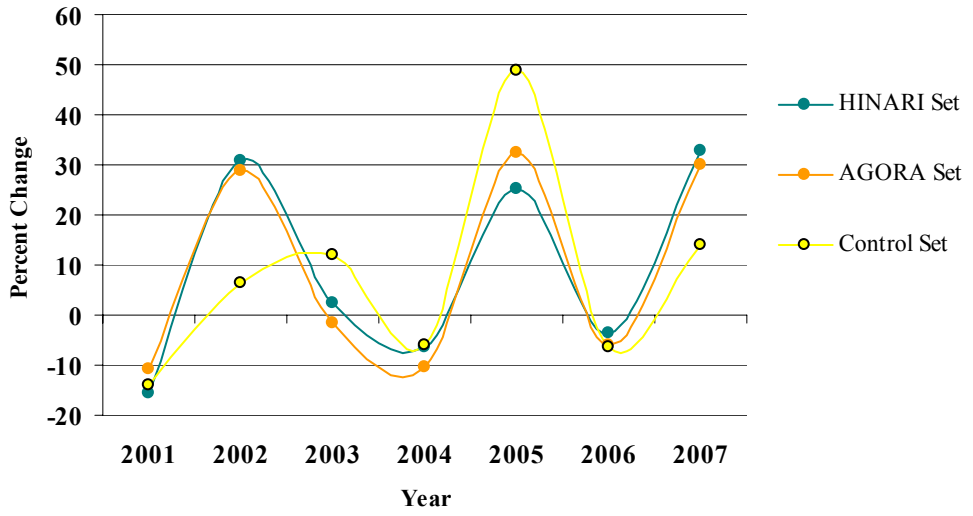


Figure C.228 Percent Change in Frequency of Citations Made by Eligible Oceanic Researchers

Table C.114 Average Percent Change in Frequency of Citations Made by Eligible Oceanic Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
2.5031	1.5462	6.0381	1.0124

C.5.1 Melanesia

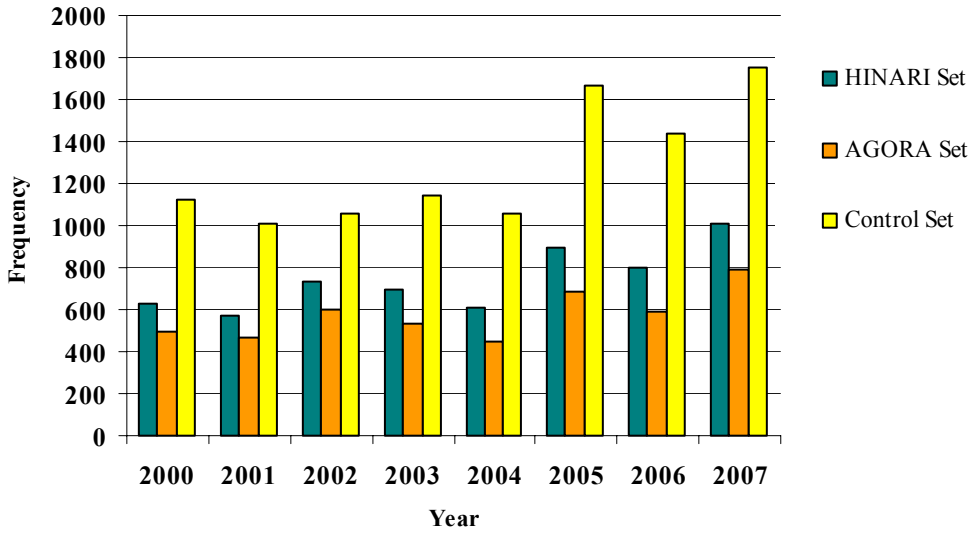


Figure C.229 Frequency of Citations Made by Eligible Melanesian Researchers

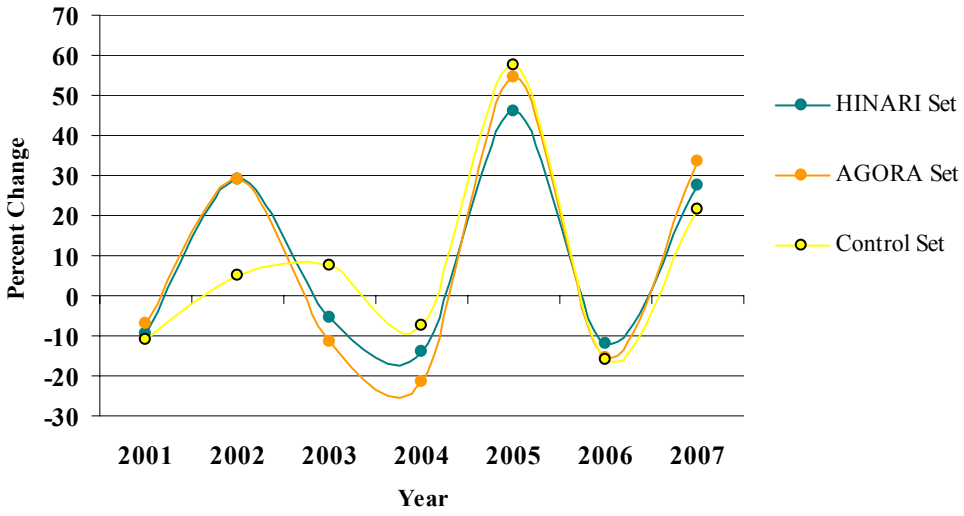


Figure C.230 Percent Change in Frequency of Citations Made by Eligible Melanesian Researchers

Table C.115 Average Percent Change in Frequency of Citations Made by Eligible Melanesian Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-1.1647	0.5998	9.2503	0.6983

C.5.1.1 Fiji

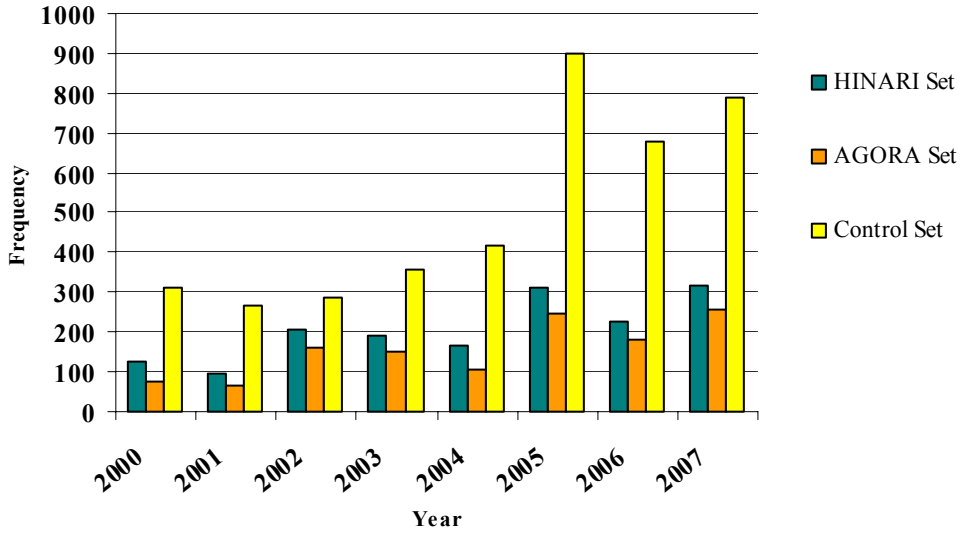


Figure C.231 Frequency of Citations Made by Fiji Researchers

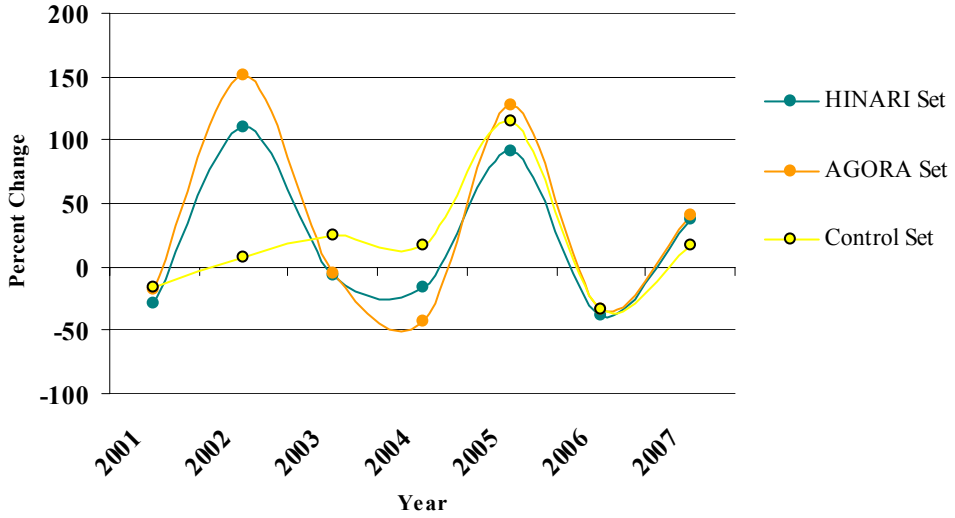


Figure C.232 Percent Change in Frequency of Citations Made by Fiji Researchers

Table C.116 Average Percent Change in Frequency of Citations Made by Fiji Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-27.0861	2.5729	-20.1477	12.7343

C.5.1.2 Papua New Guinea

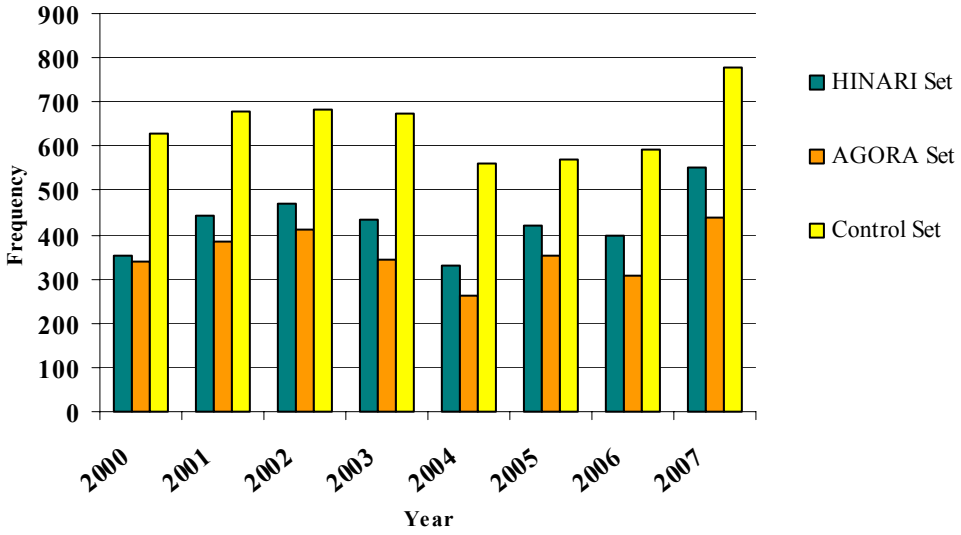


Figure C.233 Frequency of Citations Made by Papua New Guinea Researchers

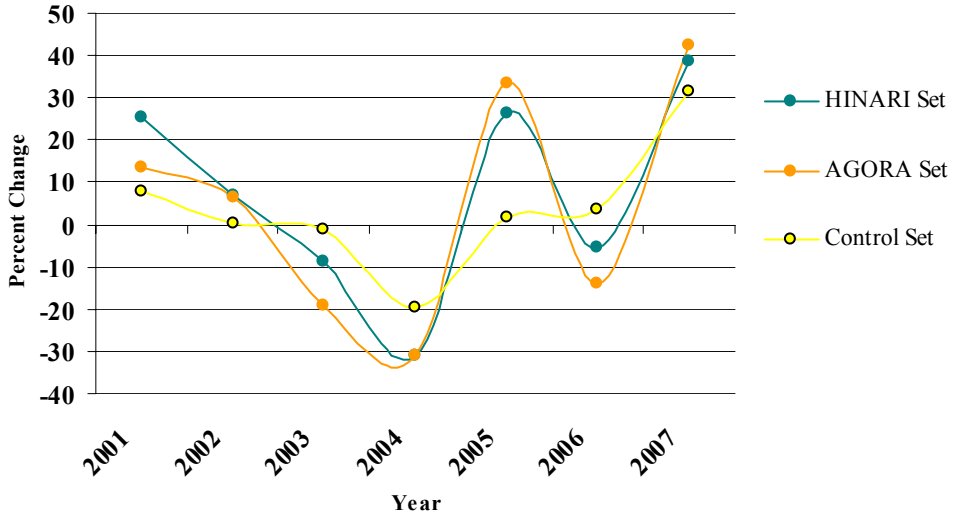


Figure C.234 Percent Change in Frequency of Citations Made by Papua New Guinea Researchers

Table C.117 Average Percent Change in Frequency of Citations Made by Papua New Guinea Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-11.8879	4.0314	7.4348	1.0636

C.5.1.3 Solomon Islands

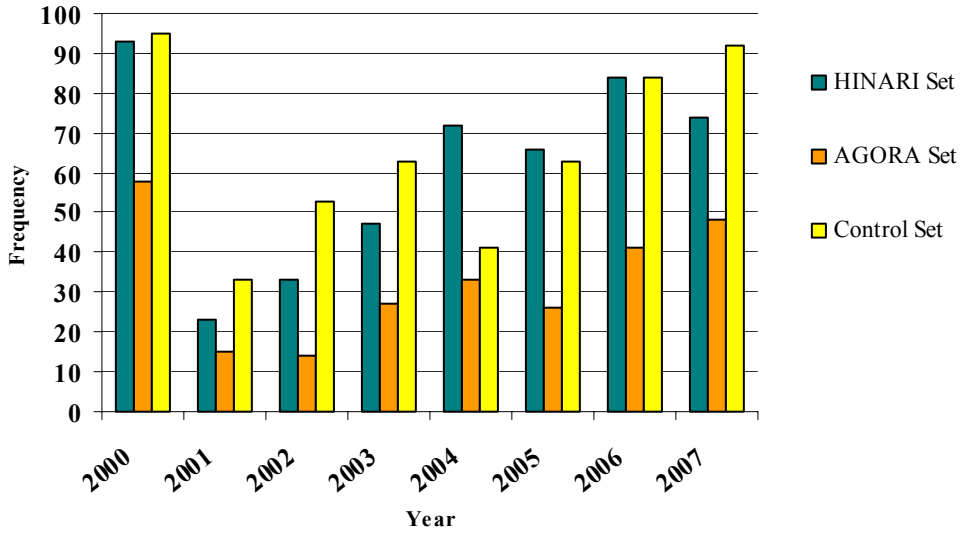


Figure C.235 Frequency of Citations Made by Solomon Islands Researchers

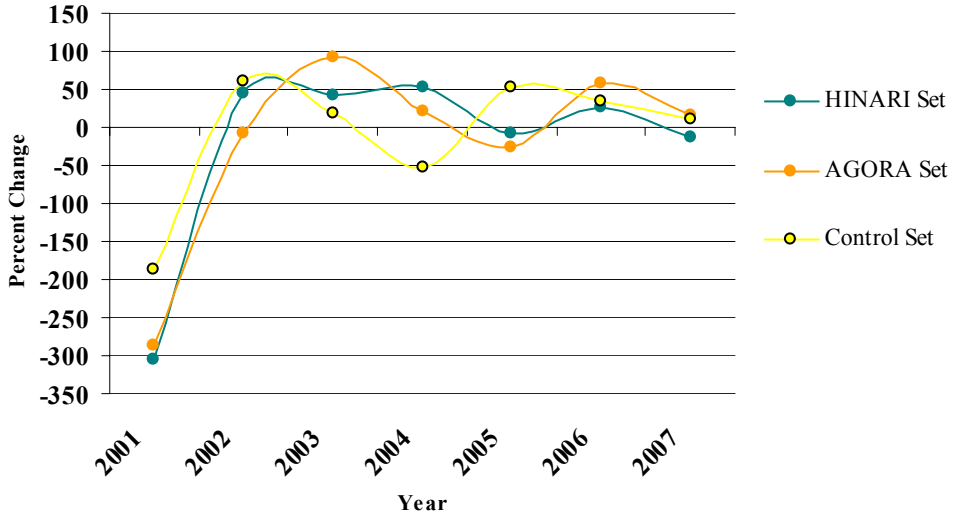


Figure C.236 Percent Change in Frequency of Citations Made by Solomon Islands Researchers

Table C.118 Average Percent Change in Frequency of Citations Made by Solomon Islands Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
150.4916	-13.5768	84.5003	-9.3343

C.5.1.4 Vanuatu

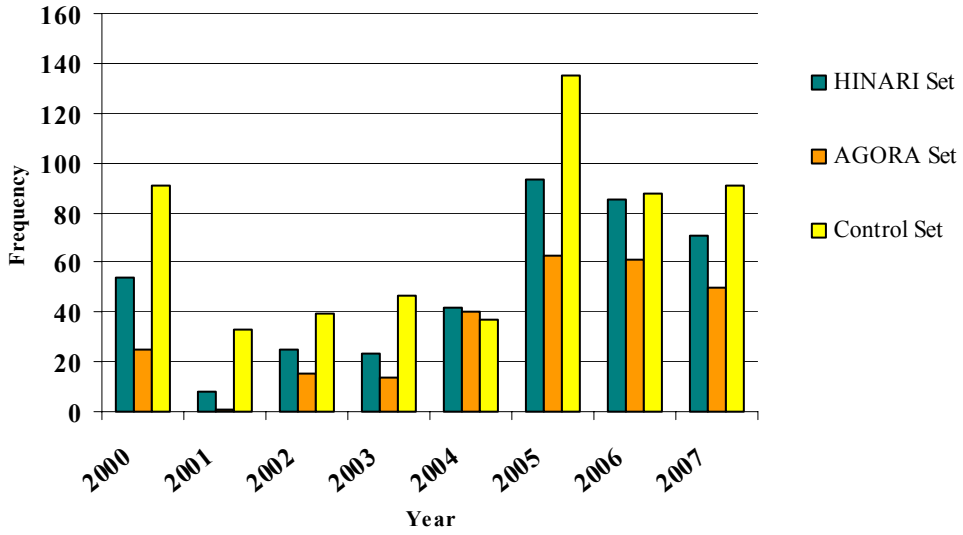


Figure C.237 Frequency of Citations Made by Vanuatu Researchers

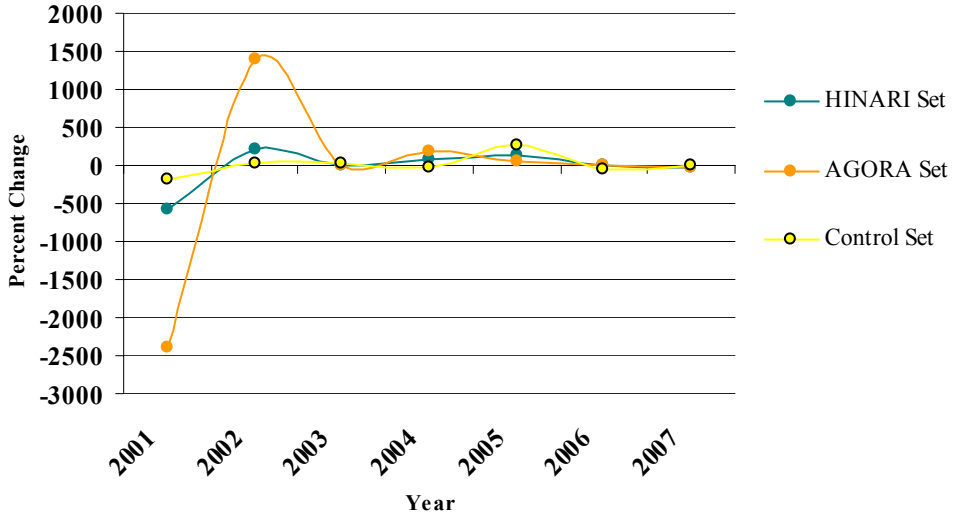


Figure C.238 Percent Change in Frequency of Citations Made by Vanuatu Researchers

Table C.119 Average Percent Change in Frequency of Citations Made by Vanuatu Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
214.4923	-35.2948	390.1982	-119.9975

C.5.2 Micronesia

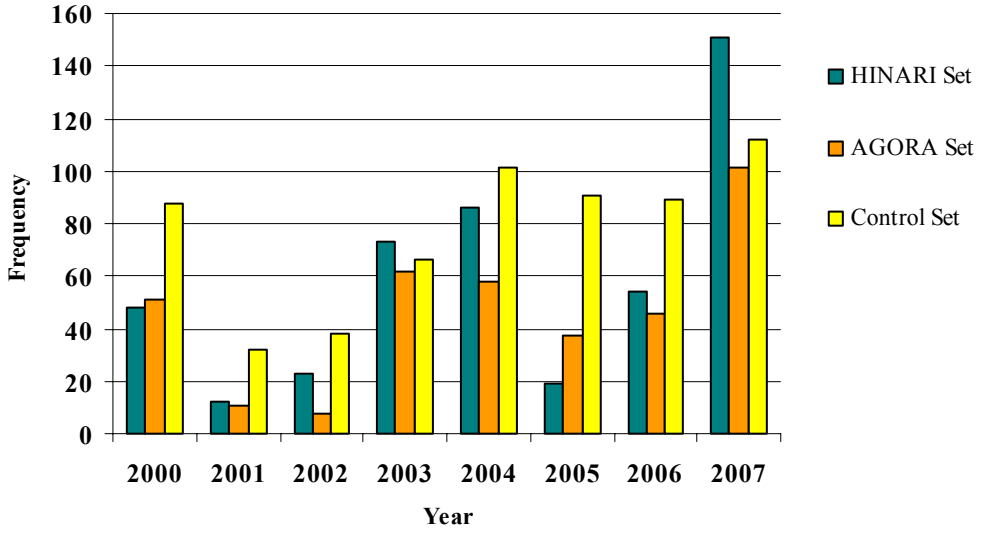


Figure C.239 Frequency of Citations Made by Eligible Micronesian Researchers

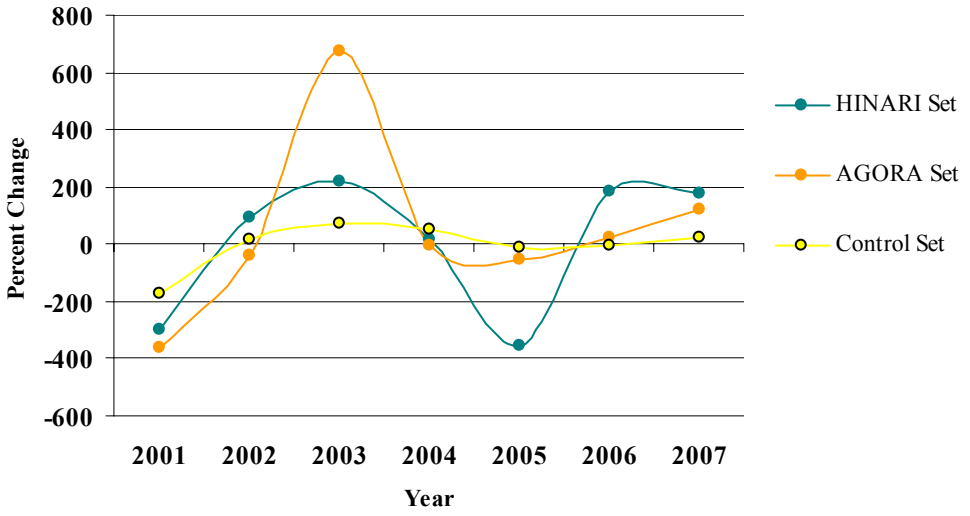


Figure C.240 Percent Change in Frequency of Citations Made by Eligible Micronesian Researchers

Table C.120 Average Percent Change in Frequency of Citations Made by Eligible Micronesian Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
153.4483	7.8577	-71.2288	53.0041

C.5.2.1 Kiribati

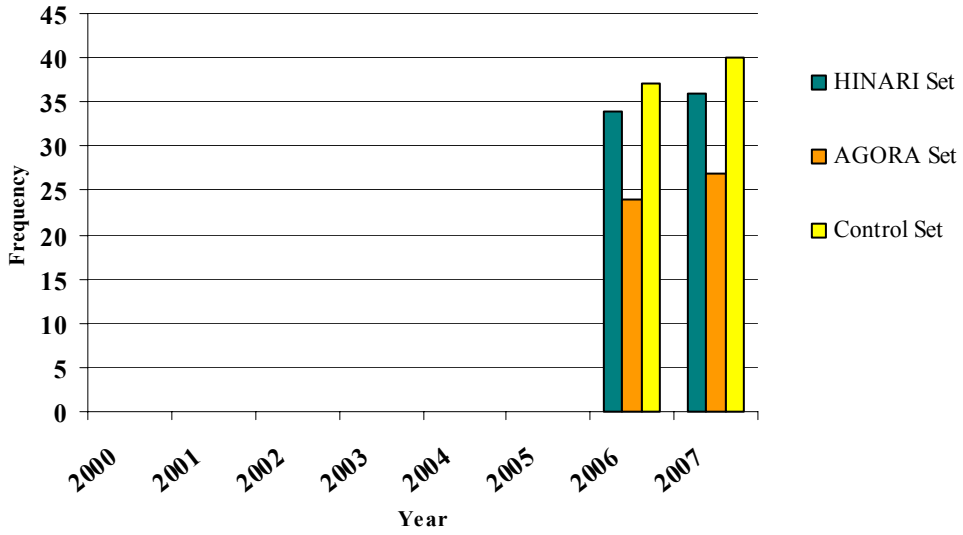


Figure C.241 Frequency of Citations Made by Kiribati Researchers

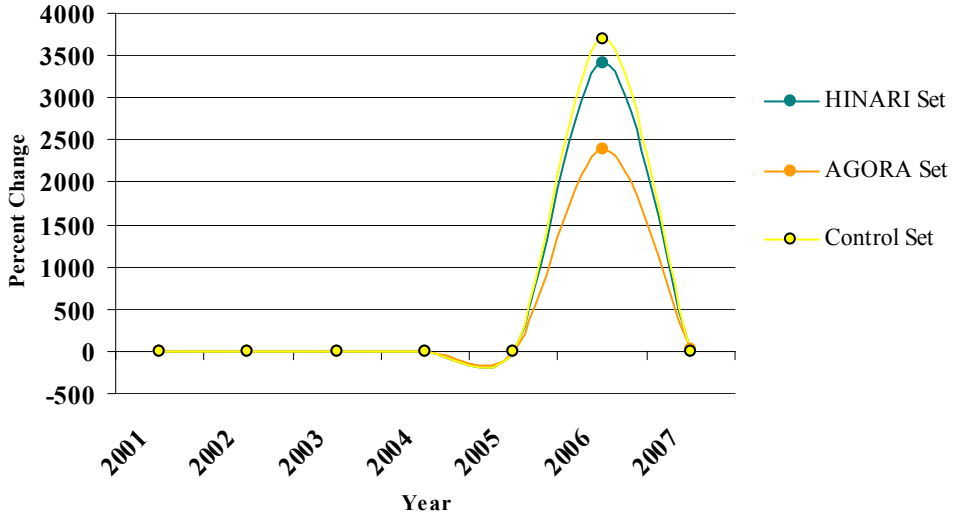


Figure C.242 Percent Change in Frequency of Citations Made by Kiribati Researchers

Table C.121 Average Percent Change in Frequency of Citations Made by Kiribati Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
681.1765	-43.1751	603.1250	-185.0869

C.5.2.2 Marshall Islands

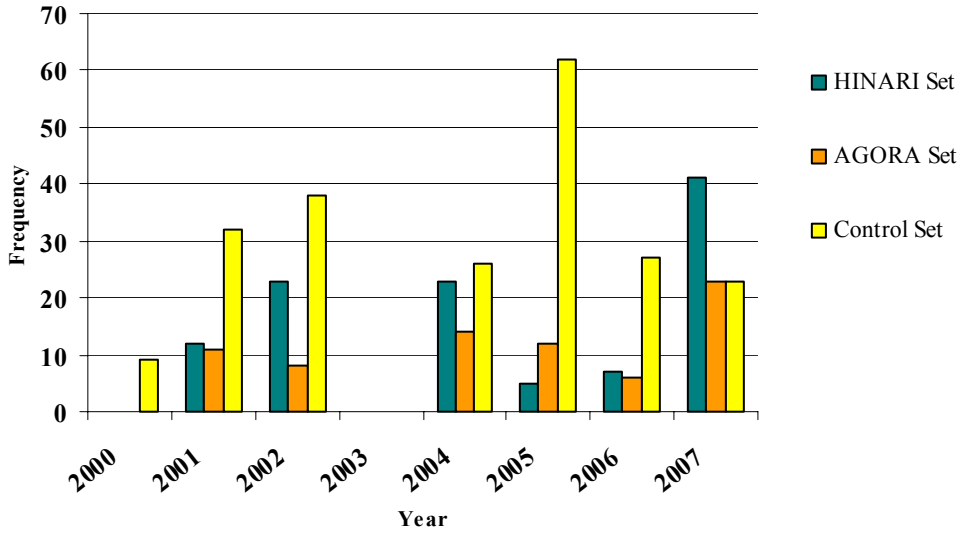


Figure C.243 Frequency of Citations Made by Marshall Islands Researchers

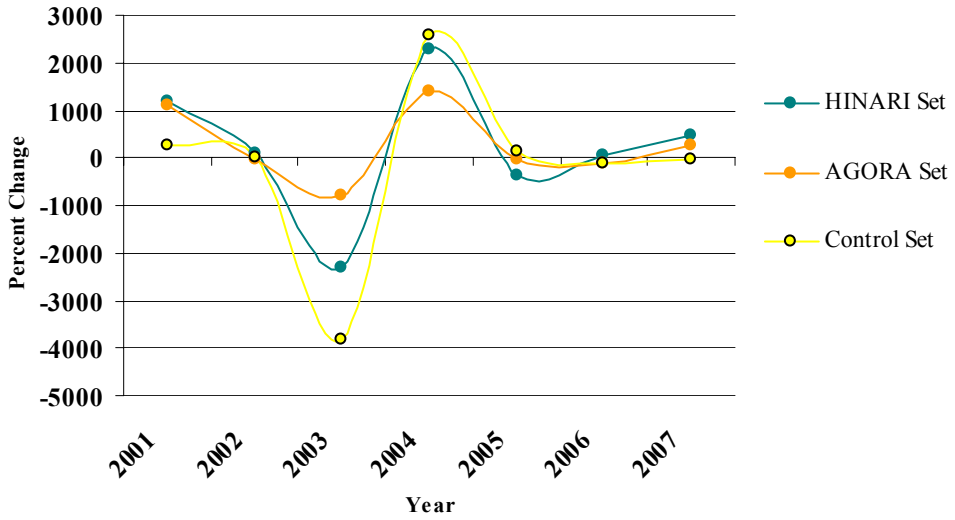


Figure C.244 Percent Change in Frequency of Citations Made by Marshall Islands Researchers

Table C.122 Average Percent Change in Frequency of Citations Made by Marshall Islands Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-612.6905	341.6621	304.1667	394.7744

C.5.2.3 Federated States of Micronesia

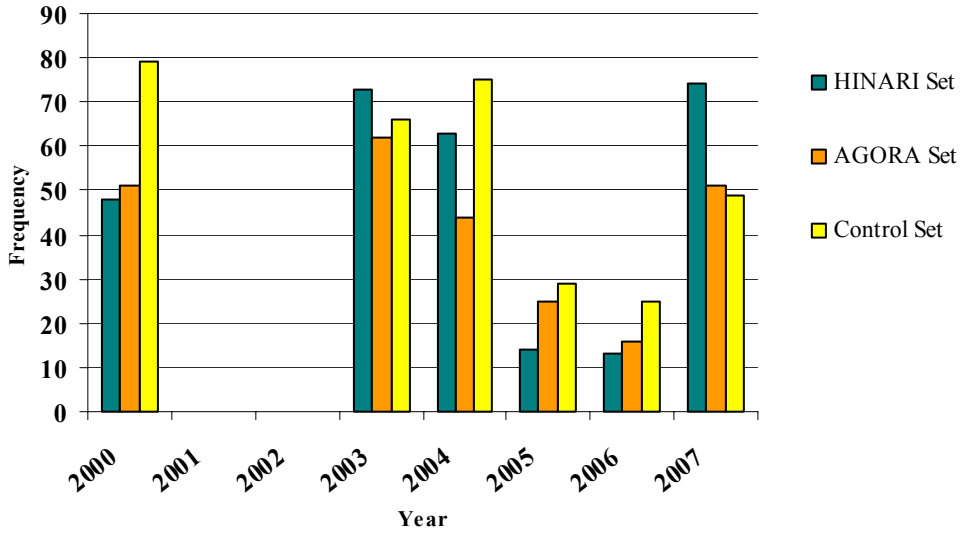


Figure C.245 Frequency of Citations Made by Federated States of Micronesia Researchers

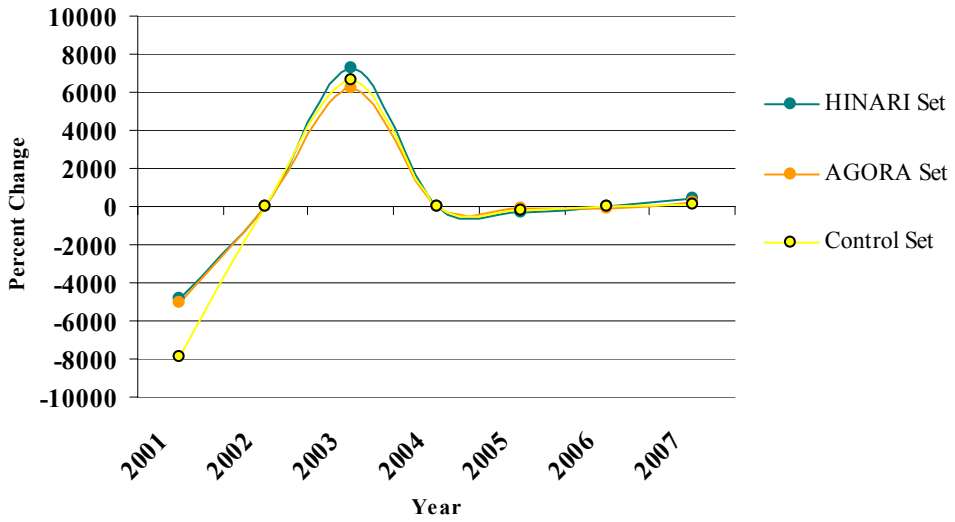


Figure C.246 Percent Change in Frequency of Citations Made by Federated States of Micronesia Researchers

Table C.123 Average Percent Change in Frequency of Citations Made by Federated States of Micronesia Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
3879.1331	565.8071	-355.2689	358.6536

C.5.3 Polynesia

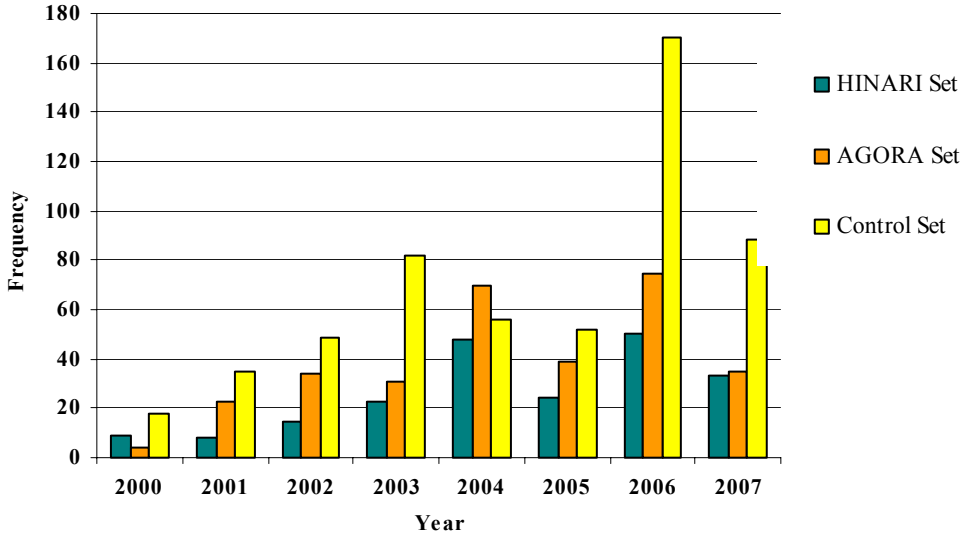


Figure C.247 Frequency of Citations Made by Eligible Polynesian Researchers

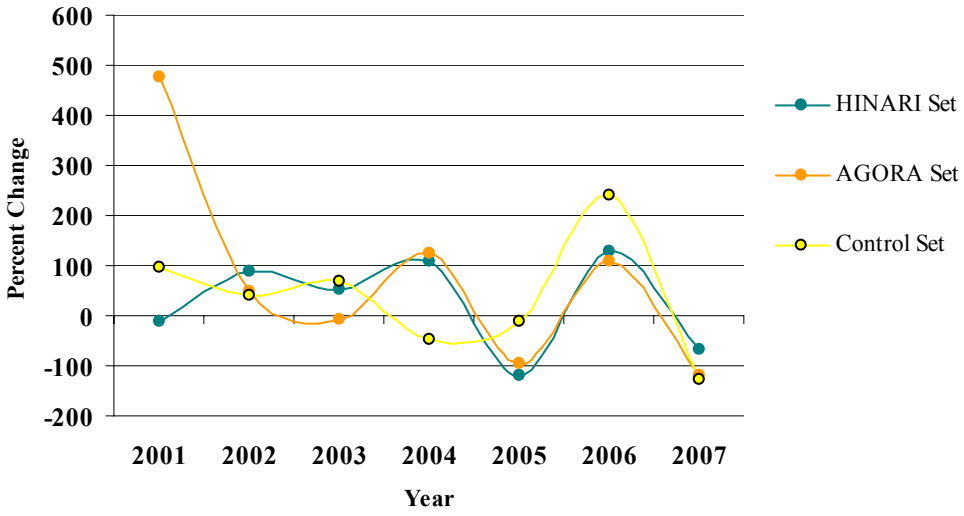


Figure C.248 Percent Change in Frequency of Citations Made by Eligible Polynesian Researchers

Table C.124 Average Percent Change in Frequency of Citations Made by Eligible Polynesian Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-16.6094	-11.0347	-166.2728	39.3657

C.5.3.1 Samoa

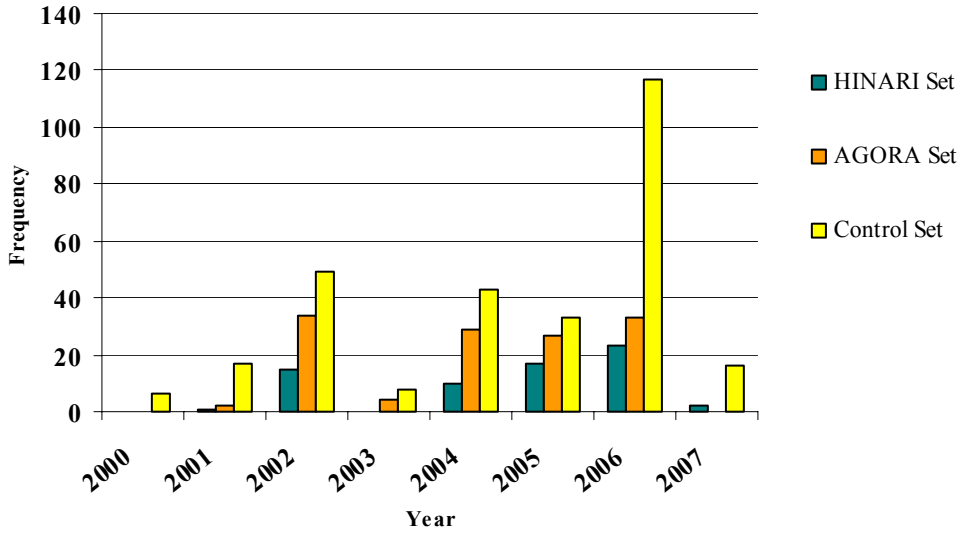


Figure C.249 Frequency of Citations Made by Samoa Researchers

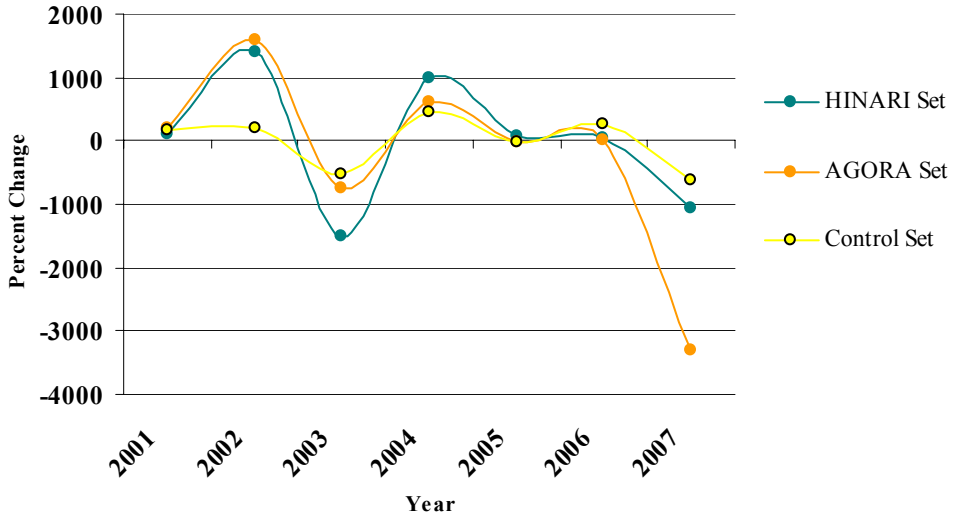


Figure C.250 Percent Change in Frequency of Citations Made by Samoa Researchers

Table C.125 Average Percent Change in Frequency of Citations Made by Samoa Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-1038.9412	23.6762	-1015.0463	-214.2495

C.5.3.2 Tokelau

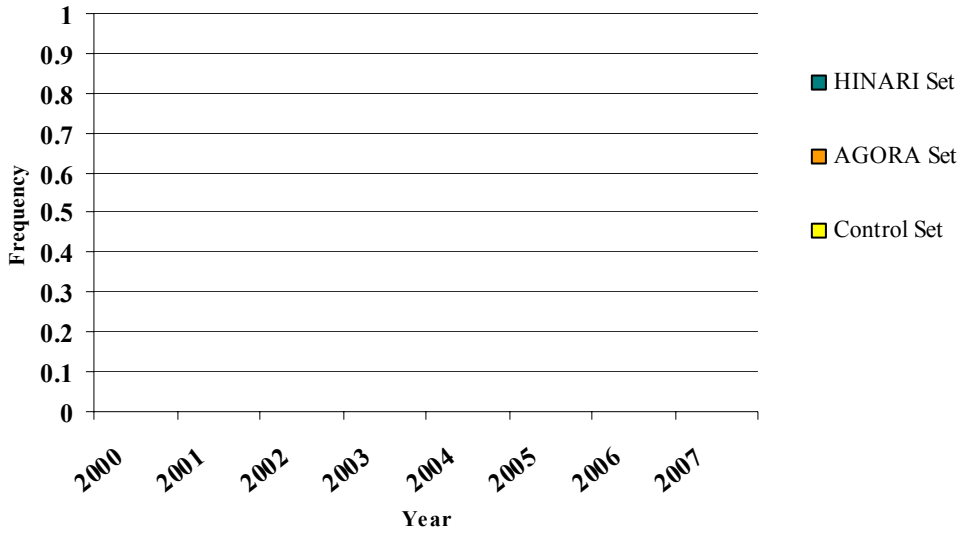


Figure C.251 Frequency of Citations Made by Tokelau Researchers

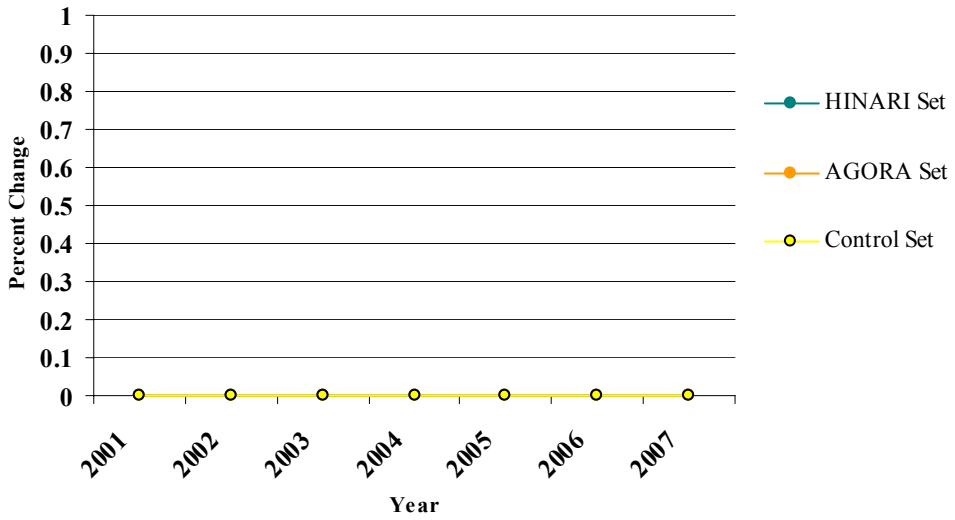


Figure C.252 Percent Change in Frequency of Citations Made by Tokelau Researchers

Table C.126 Average Percent Change in Frequency of Citations Made by Tokelau Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
0.0000	0.0000	0.0000	0.0000

C.5.3.3 Tonga

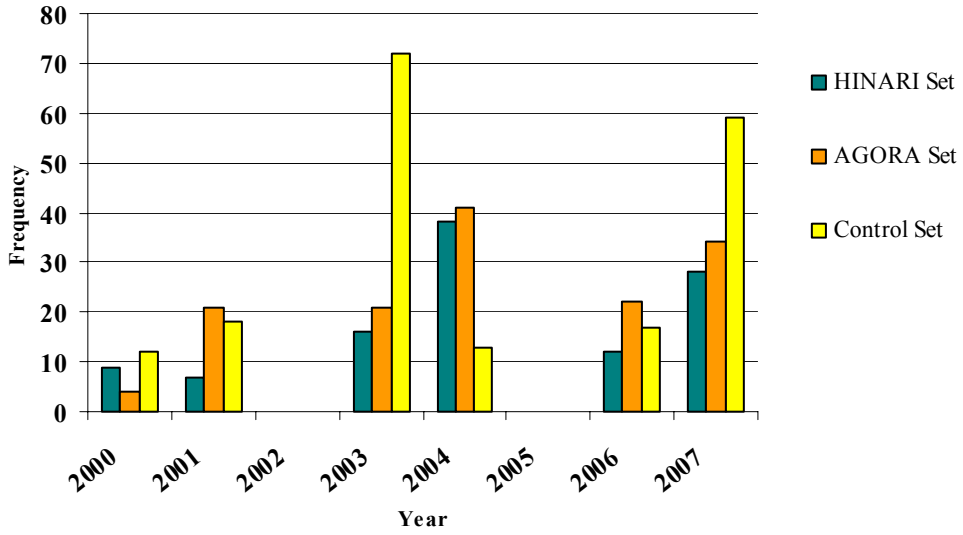


Figure C.253 Frequency of Citations Made by Tonga Researchers

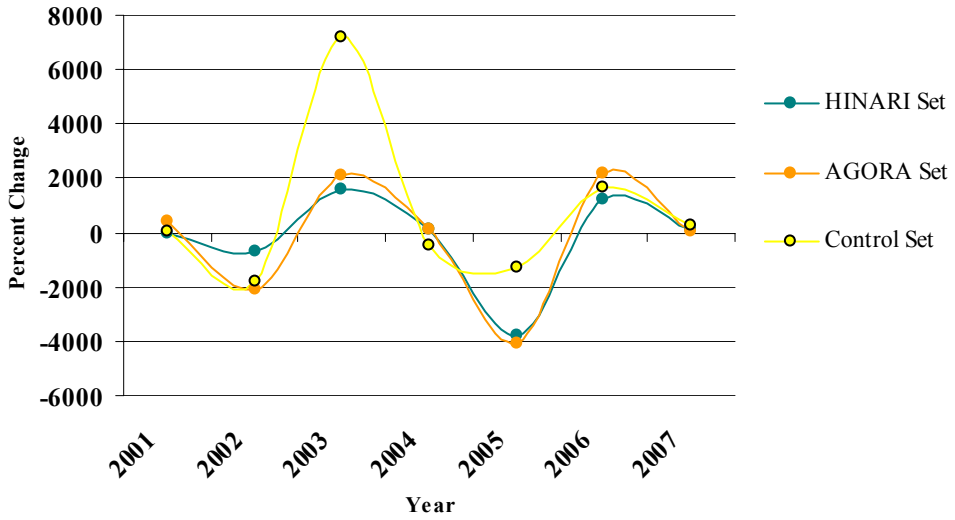


Figure C.254 Percent Change in Frequency of Citations Made by Tonga Researchers

Table C.127 Average Percent Change in Frequency of Citations Made by Tonga Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
218.4524	-1014.4215	-579.2208	-995.4899

C.5.3.4 Tuvalu

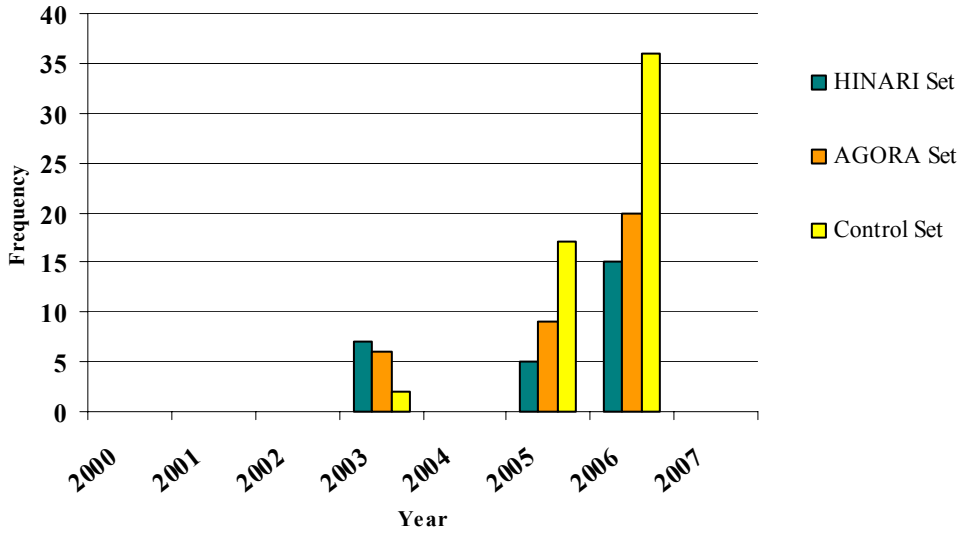


Figure C.255 Frequency of Citations Made by Tuvalu Researchers

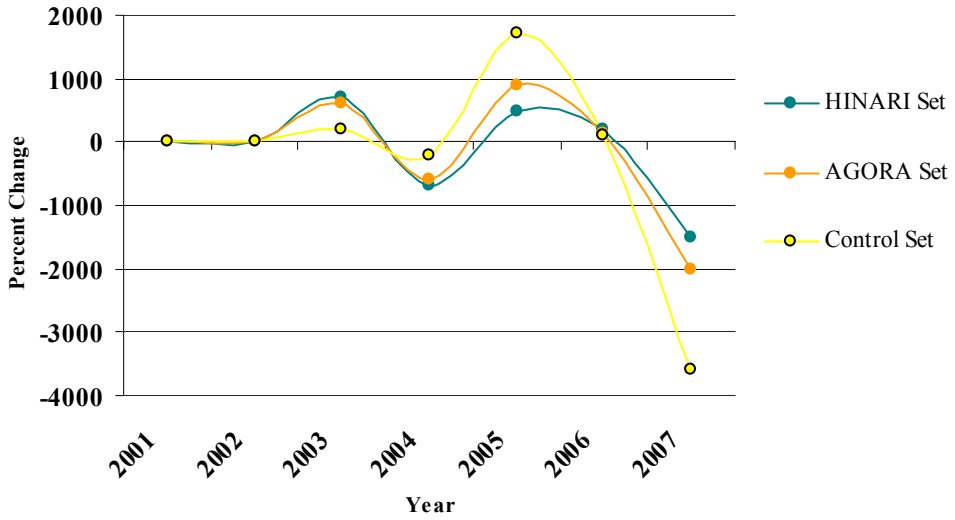


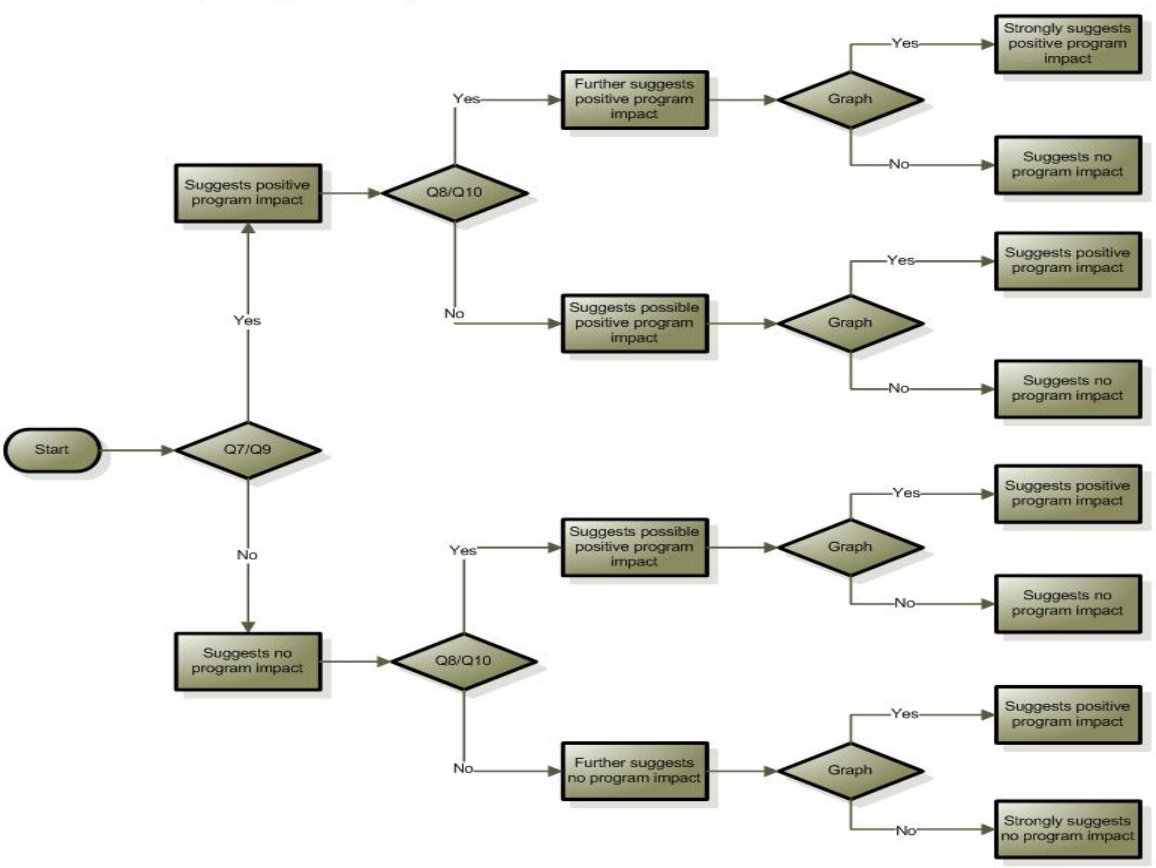
Figure C.256 Percent Change in Frequency of Citations Made by Tuvalu Researchers

Table C.128 Average Percent Change in Frequency of Citations Made by Tuvalu Researchers

HINARI Change from 2001-2002 to 2003-2007	HINARI – Control Difference 2001-2007	AGORA Change from 2001-2003 to 2004-2007	AGORA – Control Difference 2001-2007
-160.0000	141.1765	-594.4444	115.7796

APPENDIX D. FLOW OF RESULTS INTERPRETATION

Figure D.1 Flow of Results Interpretation



APPENDIX E. KNOWLEDGE ECONOMY INDEX

Table E.1 Knowledge Economy Index for Eligible Countries

Rank		Country	Missing Data	KEI	KI	Economic Incentive Regime	Innovation	Education	ICT
110	-8	Albania	X	2.7	2.78	2.46	1.56	4.71	2.07
84	22	Algeria	X	2.73	2.91	2.18	3.08	3.44	2.22
114	18	Angola	X	1.02	0.98	1.16	1.29	0.74	0.91
72	-14	Azerbaijan		3.79	4.08	2.91	4.16	4.94	3.14
107	17	Bangladesh	X	1.2	1.35	0.76	1.63	1.57	0.83
47	-15	Belarus	X	5.2	6.52	1.26	6.03	7.65	5.87
118	-2	Benin	X	1.26	0.94	2.2	1.18	0.73	0.92
90	5	Bolivia		3.57	3.73	3.09	2.64	5.36	3.18
85	36	Bosnia and Herzegovina	X	4.16	4.37	3.52	2.96	5.98	4.17
87	5	Botswana	X	4.3	3.09	7.93	2.75	2.94	3.57
44	-11	Bulgaria		6.13	6.58	4.79	6.12	7.41	6.21
123	-1	Burkina Faso		1.07	0.47	2.87	0.73	0.24	0.46
116	-3	Cameroon		1.37	1.53	0.88	1.26	1.71	1.61
55	-2	Costa Rica		5.61	5.41	6.23	5.36	4.5	6.37
101	14	Cote D'Ivoire	X	1.58	1.78	1	2.13	1.2	2

Table E.1 - Continued

Rank		Country	Missing Data	KEI	KI	Economic Incentive Regime	Innovation	Education	ICT
132	-13	Djibouti	X	0.88	0.86	0.93	0	0.87	1.71
103	-10	Dominican Republic	X	3.13	3.07	3.3	2.05	4.14	3.03
98	-7	Ecuador	X	2.98	3.34	1.91	2.27	3.63	4.13
106	-2	El Salvador		3.52	3	5.09	1.71	3.04	4.25
129	-1	Eritrea	X	0.72	0.58	1.14	0.23	0.87	0.64
124	-7	Ethiopia	X	0.72	0.51	1.37	0.61	0.81	0.1
111	-21	Ghana	X	1.97	1.47	3.47	1.45	1.32	1.63
89	-8	Guatemala	X	2.94	2.75	3.5	2.66	2.18	3.42
131	-28	Haiti	X	1.42	1.24	1.98	0.08	0.98	2.65
94	0	Honduras		2.65	2.61	2.75	2.37	3.08	2.38
64	-12	Jamaica	X	4.9	5.19	4.01	4.94	4.12	6.51
48	-2	Jordan		5.12	5.3	4.58	5.89	5.3	4.71
74	-4	Kazakhstan	X	4.35	4.92	2.62	4.05	7.61	3.11
71	-4	Kenya	X	2.62	2.76	2.21	4.18	1.83	2.28
86	-10	Kyrgyz Rep.		3.64	3.99	2.59	2.9	6.34	2.74
130	1	Lao PDR	X	0.85	0.91	0.66	0.15	1.86	0.72

Table E.1 - Continued

Rank		Country	Missing Data	KEI	KI	Economic Incentive Regime	Innovation	Education	ICT
69	20	Macedonia, FYR		4.61	4.87	3.83	4.39	5.17	5.05
109	21	Madagascar	X	2.05	1.11	4.89	1.6	1.13	0.6
115	-6	Malawi	X	1.32	0.8	2.89	1.26	0.89	0.25
125	1	Mali	X	1.15	0.45	3.27	0.5	0.45	0.41
127	0	Mauritania	X	1.64	1.07	3.32	0.38	0.96	1.87
75	12	Moldova		4.42	4.56	4	3.92	5.77	3.98
92	5	Mongolia		4.42	4.37	4.56	2.42	6.22	4.49
77	-2	Morocco	X	3.1	3.16	2.9	3.58	1.85	4.06
126	3	Mozambique	X	1.04	0.54	2.52	0.42	0.28	0.93
108	-7	Namibia	X	3.33	2.66	5.34	1.6	2.58	3.8
104	-4	Nicaragua		2.93	2.56	4.03	1.98	2.99	2.7
91	-3	Nigeria	X	1.57	1.94	0.45	2.51	1.82	1.48
122	-4	Paraguay		2.64	2.75	2.31	0.8	3.99	3.48
80	-1	Peru		4.18	4.43	3.45	3.33	5.3	4.65
57	-1	Romania		5.37	5.72	4.31	5.17	5.94	6.05
119	-9	Senegal		2.08	1.52	3.76	1.09	0.79	2.67

Table E.1 - Continued

Rank		Country	Missing Data	KEI	KI	Economic Incentive Regime	Innovation	Education	ICT
50	-7	Serbia and Montenegro	X	4.89	5.75	2.31	5.83	5.85	5.57
128	-5	Sierra Leone	X	0.44	0.29	0.89	0.27	0.34	0.27
112	-4	Sudan	X	1.3	1.65	0.23	1.37	1.51	2.08
99	15	Syrian Arab Republic	X	2.47	2.76	1.62	2.24	2.8	3.23
113	-8	Tajikistan	X	2.26	2.3	2.15	1.3	5.06	0.53
97	15	Tanzania	X	1.84	1.4	3.15	2.28	0.79	1.13
66	0	Tunisia		4.2	4.39	3.64	4.7	3.88	4.58
105	-6	Uganda		1.97	1.29	4	1.9	1.11	0.87
49	-15	Ukraine		5.55	5.95	4.33	5.86	7.66	4.34
82	-9	Uzbekistan	X	3.21	3.75	1.6	3.23	5.79	2.23
96	29	Vietnam		2.69	2.82	2.28	2.31	3.4	2.75
117	-10	Yemen, Rep.	X	1.41	1.55	0.99	1.25	1.67	1.73
120	-9	Zambia		1.53	1.17	2.6	1.07	1.18	1.26
78	-15	Zimbabwe	X	2.37	3.14	0.08	3.57	2.44	3.41

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Zipp, L. S. (1996). Thesis and dissertation citations as indicators of faculty research use of University Library journal collections. *Library Resources and Technical Services, 40*(4), 335-342.

BIOGRAPHICAL SKETCH

Sheri V. T. Ross

Education

- Doctor of Philosophy, fall semester, 2008, College of Information, Florida State University, Tallahassee, Florida
- Master of Science, Information Science, 2001, University of North Texas, Denton, Texas
- Master of Arts, Cultural Anthropology, 1993, State University of New York, Buffalo, New York
- Bachelor of Science, Business Management, 1988, George Mason University, Fairfax, Virginia

Research Interests

- Scholarly Communication – quantitative and qualitative exploration of the global scholarly dialogue focusing on emerging academic cultures and their assimilating or isolating characteristics
- Information Ownership and the Academic Library – analysis of the ethical climate and practice in academic libraries with attention to copyright, fair use, preservation, and the library's role in the open-access movement
- Electronic Resources Management – examination of new techniques and technologies used in the acquisition, delivery, and management of library electronic resources and their related technical services

Teaching Experience

- Instructor, LIS 5411: Information Policy. College of Information, Florida State University, Tallahassee, Florida. Spring 2007, Spring 2008. Graduate course; synchronous and asynchronous online.
- Instructor, LIS 5703: Information Organization. College of Information, Florida State University, Tallahassee, Florida. Fall 2006. Graduate course; face to face and asynchronous online.
- Instructor, LIS 3021: Technical Communications for Information Professionals. College of Information, Florida State University, Tallahassee, Florida. Summer 2006. Undergraduate course; face to face.
- Instructor, LIS 1001: Techniques for Library Research, Manhattanville College, Purchase, New York. Fall and Spring 2001-2003. Undergraduate course (1 credit), face to face and asynchronous online.
- Teaching Assistant, LIS 5411: Information Policy. College of Information, Florida State University, Tallahassee, Florida, Summer, Fall 2005 and 2008. Graduate course; synchronous and asynchronous online.
- Teaching Assistant, LIS 3021: Technical Communications for Information Professionals. College of Information. Florida State University, Tallahassee, Florida, Spring 2006. Undergraduate course; face to face.
- Teaching Assistant, LIS 5408: Management of Information Organizations. College of Information, Florida State University, Tallahassee, Florida, Spring, Summer, Fall 2005. Graduate course; synchronous and asynchronous online.

Publications

2008. "A study of citations made to journals offered through the Access to Global Online Resources in Agriculture (AGORA) program by authors from eligible Asian countries." Conference Proceedings, World Conference on Agricultural Information and IT. University of Tokyo, August, 2008 (In Press).

2007. "Ethical Climate Typology and Questionnaire: A Discussion of Instrument Modifications." Journal of Academic Librarianship. 33, 567-580.

2005. Internet Review: "California Geographical Survey." College and Research Library News 66(11), 763.

2004. "Applying Program Assessment Techniques to Electronic Resources Management." Technical Services Quarterly 22(1), 9-20.

2004. Internet Review: "The Kinsey Institute for Research in Sex, Gender and Reproduction." College and Research Library News 65(3), 163.

2002. Internet Review: "National Park Service Archaeology and Ethnography Program." College and Research Library News 63(12), 827.

2002. Internet Review: "The American Museum of Natural History's Congo Expedition." College and Research Library News 63(5), 362.

Presentations

"A Study of Citations Made to Journals Offered through the Access to Global Online Resources in Agriculture (AGORA) Program by Authors from Eligible Asian Countries." Paper presented at the World Conference on Agricultural Information and IT, Tokyo, August, 2008 (Forthcoming).

"Scholarly Use of Journals in the HINARI and AGORA Collections." Presentation for the Project Athena Pre-conference, American Library Association, June, 2007.

"Globalization of Scholarly Communication." Panel speaker for the Information Policy and Information Ethics Special Interests Groups Joint Program "Life after WSIS". American Society for Information Science and Technology Conference, November, 2006.

"Information Ownership in the Digital Environment: Examining the Ethical Climate in Libraries." Presentation for the Electronic Resources and Libraries Conference, March, 2006.

"Electronic Resources Management: Exploring the Ethical Climate." Research-in-progress poster presentation for Association for Library and Information Science Education Annual Conference, January, 2006.

"Library Success Stories." Panel speaker for the official side event of the World Summit on the Information Society sponsored by the International Federation of Library Associations and Organizations, Tunis, November, 2005.

"Effective Electronic Resources Management." Invited speaker for the Section on the Management of Information Technology Program. New York Library Association Annual Conference, November, 2003.

"Applying Program Assessment Techniques to Electronic Resources Management." Poster presentation for the Association of College and Research Libraries Biennial Conference, April, 2003.

"Introducing ALEPH: the systems perspective." Panel speaker for the South-eastern regional campuses orientation to SUNY-wide ALEPH implementation, June, 2003.

"Electronic Resources Management: Program Development and Assessment Techniques for College Libraries." Poster presentation for the New York Library Association Annual Conference, October, 2002.

Professional Service

- External Review Panelist. American Library Association Office for Accreditation, 2006-present.
- College of Information Representative. Congress of Graduate Students. Florida State University, 2004-2006.
- Delegate. World Summit on the Information Society. Society for the Social Study of Science and the International Federation of Library Associations and Organizations, Alexandria and Tunis, 2005.
- Library Faculty Representative. Tenure and Review Committee. Purchase College, State University of New York, 2002-2004.
- Committee Member. Liaison Committee, Anthropology and Sociology Section of the Association of College and Research Libraries, 2002-2004.
- Treasurer/Secretary. Academic and Special Libraries Section, New York Library Association, 2002-2004.
- Chair. Westchester/Lower Hudson Valley Section, Association of College and Research Libraries, New York Chapter, 2002-2003.

Related Experience

- Industry Advisory Board Member. Greenwood Electronic Publishing, Westport, Connecticut. 2003-2006.
- Systems / Electronic Resources Librarian, Purchase College Library, State University of New York at Purchase. 2002-2004.
- Social Sciences / Electronic Resources Librarian, Purchase College Library, State University of New York at Purchase. 2001-2002.
- Graduate Library Assistant, Humanities and Social Sciences Department, Willis Library, University of North Texas, Denton, Texas. 2000 through 2001.
- Reference Associate, Minneapolis Public Library, Minneapolis, Minnesota. April 1999 through August 2000.

Honors and Awards

- Project Athena Fellow, 2004 – 2007
- Preparing Future Faculty Fellow, 2006
- Association of College and Research Libraries Effective Practices Citation, 2003 – 2005.
- Beta Phi Mu, inducted 2001
- Phi Kappa Phi, inducted 2001
- Society for Scholarly Publishing Grant, 2006
- United University Professions Professional Development Award, 2002, 2003
- Purchase College Affiliates Grant, 2002
- ACRL Graduate Student Scholarship, 2001
- Mark Diamond Grant, 1992

Professional Associations

- Association for Library and Information Science Education

- American Society for Information Science and Technology
- American Library Association
- Library and Information Technology Association
- Association of College and Research Libraries