11

Research Integrity and Ethics

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Introduction

Research is vital in creating knowledge and leads to new insights, discoveries and creations, thereby contributing to the process of societal development. As such, research should be of good quality and conducted with values associated with integrity and ethics. The research community has increasingly become aware of the need for good quality and responsible research. Attention has been drawn to degree certificates which have been withdrawn in cases where research misconduct has been found, even after 20 years. Researchers should therefore strive to be objective and logical and should maintain integrity and ethical principles when conducting research. This chapter presents the importance of research integrity and ethics in the entire research process. The chapter explains the general guidelines for conducting research in a responsible and ethical manner. This is done under five themes: (1) ethical principles,(2) laws and requirements for conducting ethical research, (3) application of ethical principles to practice, (4) ethical review, and (5) professionalism. As emphasized by the National Academy of Sciences (NAS),

> The scientific research enterprise, like other human activities, is built on a foundation of trust. Scientists trust that the results reported by others are valid. Society trusts that the results of research reflect an honest attempt by scientists to describe the world accurately and without bias. The level of trust that has characterized science and its relationship with society has contributed to a period of

> unparalleled scientific productivity. But this trust will endure only if the scientific community devotes itself to exemplifying and transmitting the values associated with ethical scientific conduct (NAS 1995:134).

Indeed, research integrity and ethics are an integral part of all the stages in the research process: right from the planning of the research when developing the proposal and reviewing literature, to conducting the research in terms of data collection and analysis, and to disseminating the results through reports and journal articles. *Integrity* is concerned with issues of fairness and requires trustworthy conduct (Abrams and McMillan 2016;) while *ethics* are standards and principles that are used to guide conduct, to determine what is right or wrong, a virtue or vice, good or evil, often related to values and morals (Abrams and McMillan 2016). Thus *integrity* refers to a set of codes of values, while *ethics* relates to accepted standards. For example, while ethics explores aspects such as informed consent and protecting confidentiality, research integrity reflects upon such aspects as honesty, fabrication of data, and plagiarism (Mouton 2017). Thus, *integrity* is the quality of being honest and having strong moral principles, moral uprightness. It is generally a personal choice to hold oneself to consistent moral and ethical standards. Also, in the research process, ethics focuses on the application of ethical standards in the planning of a study, the data collection and analysis, dissemination and use of results. The remainder of this chapter describes the main ethical issues, principles and practices that have been adopted by researchers followed by the framework of Abrams and McMillan (2016).

Ethical Principles

Good research requires patience and sometimes the researcher may become disappointed or discouraged particularly if the planned activities or expected results do not materialize. However, professional ethics must always be the motto of a good researcher; such that the standards of performance and level of professionalism should be maintained. Ethical standards include those that enjoin virtues of honesty, compassion, and empathy when dealing with subjects or other living things. These standards must include the right to life, the right to protection from pain or injury, and the right to privacy (Mugenda 2008).The fundamental ethical principles for professional practice adopted by researchers reflect six main principles as outlined by Abrams and McMillan (2016) and common to research as summarized in Figure 11.1 and briefly defined thereafter.

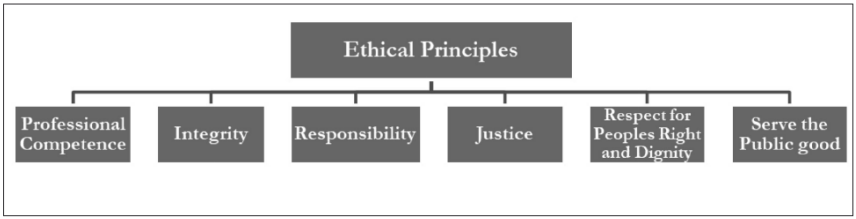

Figure 11.1 Ethical Principles
Source: Self-generated by the Author

1. *Professional competence* addresses the view that researchers understand work within their areas of competence and consult other researchers in areas when needed.
2. *Integrity* is an important principle that speaks to the honest and trustworthy researchers, who should not cheat, steal, deceive or misrepresent, rather they should always promote accuracy.
3. *Responsibility* by the researcher is necessary, and at all times, researchers must accept responsibility for their work and should be sensitive to the ethical behavior of their fellow researchers.
4. *Justice:* researchers should be sensitive to the welfare of all individuals, consider all perspectives in making decisions, and not allow biases to result in unjust actions. The principle of justice demands that the results of research are reported in ways that are sensitive to the different characteristics of the study participants.
5. *Respect for People's Rights and Dignity:* researchers must respect the rights and dignity of all research participants and be sensitive to cultural, individual, sexual, ethnic and role differences. Indeed, all participants must be held in high regard.
6. *Service to Public Good:* researchers pay attention to what is good for the larger society and design and report research findings that result in the greatest public good.

Laws and Requirements for Conducting Ethical Research

All researchers should understand the laws and requirements that regulate and inform the policies for conducting ethical and responsible research. It is important that researchers have knowledge of the legal requirements for conducting ethical research at their institutions as well. The procedures should be clear and

transparent for all researchers and it is the obligation of any research institution to establish clear policies. Researchers should be aware of and comply with the laws and regulations for the different disciplines.

These laws and requirements for conducting ethical research have evolved throughout the history of science and had been acknowledged initially in relation to animal research and medical research (e.g., Charles Darwin) and later to human experiments. Briefly worth noting here are four milestones that have shaped ethical research: (1) the Nuremberg Code, 1949; (2) the Declaration of Helsinki, 1964; (3) the Belmont Principles,1979 and (4) the Singapore Statement on Research Integrity, 2010. These ethical research requirements are briefly described as follows:

- *The Nuremberg Code* is a set of research ethics principles for human experimentation set as a result of the subsequent Nuremberg trials at the end of the Second World War (Nuremburg Code 1949)
- *The Declaration of Helsinki* is a set of ethical principles regarding human experimentation developed for the medical community by the World Medical Association (WMA). It is widely regarded as the cornerstone document on human research ethics (WMA 2017). It has since been amended usually during the general assembly with the changing face of medical research. It presents the scientific requirements and research protocols
- *The Belmont Report* summarizes the guidelines for the protection of human subjects of biomedical and behavioral research. It provides philosophical underpinnings for laws governing research involving human subjects (Belmont Report 1979). Three core principles – (1) respect for persons, (2) beneficence, and (3) justice – are described in relation to application to practice.
- *The Singapore Statement on Research Integrity* provides the codes to promote ethical conduct among scientists (Resnik and Shamoo 2011). The Singapore Statement includes four principles – (1) honesty, (2) accountability, (3) professionalism, and (4) stewardship – and 14 responsibilities for the ethical conduct of research. The responsibilities address such topics as data integrity, data sharing, record keeping, authorship, publication, peer-review, conflict of interest, reporting misconduct and irresponsible research, communication with the public, complying with regulations, education, and social responsibilities.

The National Research Council in any country has the mandate to ensure that laws are in place and are adhered to when conducting research.

Application of Ethical Principles to the Practice of Research

The three core principles that should govern all research and researcher-participant interactions also referred to as the Belmont Principles. As mentioned earlier, they are (1) respect for persons, (2) beneficence, and (3) justice. These principles are summarized in Table 11.1 and briefly described subsequently.

Table 11.1 Belmont Principles and Applications for Research

Principle	Principle in Practice
Respect for persons	Participants are provided with all information about the study in order to make an informed decision through the informed consent and/or child assent process; voluntary participation and withdrawal are supported.
Beneficience	All research should be designed to minimize risk or possible harm and to maximize benefit to the participant and to the society.
Justice	Benefits and burden of medicine/research should be fairly distributed among all populations. Researchers must be careful not to select already burdened or vulnerable groups who might be more easily coerced to participate.

Source: Belmont Report (1979)

Respect for Persons: It is important for researchers to respect the study participants and not take undue advantage, particularly of vulnerable groups such as patients, prisoners, street children, refugees, or drug addicts amongst others. There should be informed voluntary consent of all the participants in the research and vulnerable groups must be protected (Abrams & McMillan, 2016). Respect for persons can be achieved through the informed consent process. A researcher should provide a description of his/her research study, what it entails, and the type of information required to enable the participant to make an informed decision regarding their participation. Thus; the participants should be (a) informed of the objectives of the research,(b) made aware of their rights, and (c)be able to decide if they wish to participate and/or when they wish to terminate their participation. Participants should understand what the study is for, what risks they may take in participating

and the benefits (if any) they might receive. Details of the issues in informed consent are indicated in Table 11.2 and an example of a consent form in Table 11.3.

The contents of the informed consent form (Table 11.3) should be explained prior to the start of an interview or be provided in a questionnaire's introduction section. If the interviews are recorded, this should be done with the permission of the participants. The consent form can also have a section that allows for the recording of the interviews. The consent form can be signed by both the participant(s) and the researcher. Alternatively, there can be a 'gentleman's agreement' regarding the participation without infringing on their rights.

Table 11.2: Elements for Informed Consent for Participants in Social Science Surveys

Individually, identifiable participants in the social research surveys must be informed:
1. that research is being conducted;
2. of the procedures they will be experiencing;
3. of the risks and benefits reasonably to be expected;
4. of the purpose of the research;
5. of the anticipated uses of the information;
6. of the names, addresses, and telephone numbers of the researchers;
7. of the name, addresses, and telephone numbers of the sponsors of the research;
8. that they are free to ask questions and may refuse to participate; and
9. that they may later withdraw from the research and the consequences of such withdrawal (cancellation of income subsidies, etc.).

Source: Belmont Report (1979)

Table 11.3: A Typical Informed Consent Form

Informed Consent to Participate in a Research Study
Title of the Study
Assessment of the hydrogeology and the geochemistry of the groundwater systems in Kenyatta University and the emerging surrounding settlements
Description of the Research and Your Participation
You are invited to participate in a research study being carried out by Miriam Adongo and Moses Tsuma. Before you decide, you need to understand what the

study is for, what risks you might take by participating, and what benefits you might receive. Please read the following information carefully and feel free to ask questions if there is anything that is not clear or if you need more information.

This study has two broad objectives:

1. To assess the hydrogeology and geochemistry of the area to determine groundwater vulnerability
2. To assess the groundwater quality and come up a Water Quality Index for the area.

We will be taking borehole water level measurements, collecting water samples, and carrying out geophysical experiments. The data mentioned above will be collected on a monthly basis from May to September. Your participation will significantly contribute to achievement of the objectives.

Risks and Discomforts

The research is strictly for academic purpose thus there are no known risks associated with this research.

Potential Benefits

If you request, we will provide you with the results of the analysis of your water sample; this will also include information on what you should do if a high level of certain chemicals tested is found in your borehole water.

Voluntary Participation

Your participation in this research study is voluntary. You may choose not to participate, and you may withdraw your consent to participate at any time. You will not be penalized in any way should you decide not to participate or to withdraw from this study.

Your Rights

Protecting your privacy is an important part of this study.

When you sign this consent form you give us permission to:

- Access your borehole to take water level measurements ones in a month from May-Sep 2016
- Collect at least 1 liter of water from your borehole/shallow well

Your name and contact information will be kept secure by the research team at Kenyatta University. Your contact information will not be shared with others without your permission. Your name will not appear in any report or article published as a result of this study.

After you have signed this consent form you will be given a copy. If you have any questions or concerns about the study, you may contact Research Principal Investigator Dr. Mary Makokha or Research Co-principal Investigator Prof. Joy Obando both of the Department of Geography, Kenyatta University. P. O. Box 43844-00100, Nairobi, Kenya, Telephone: +254-20-871901.

Consent

I have read, and I understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

_____	_____	_____
Name of Participant	Date	Signature
_____	_____	_____
Name of Researcher	Date	Signature

Respect for persons includes respecting diverse cultures, marginalized groups such as pastoralists, persons with special needs such as orphans, refugees and internally displaced persons. These groups may be illiterate and in translating the survey instruments the researcher should adhere to ethical standards to ensure that they fully understand the research purpose as well as their rights. During fieldwork, researchers should also respect the diverse cultures and should not offend by way of addressing and in the manner in which different members of the community are addressed. Researchers must have a prior knowledge and understanding of the participant community so that they are sensitive to their needs and to therefore embrace these diverse ways of life: for example, the pastoralists who may still be leading a nomadic lifestyle.

Researchers are advised to desist from giving incentives to participants as a means of increasing participation during data collection. This is discouraged since the participants can develop an attitude for requesting payment before responding and feel that it is their right to be paid for participating in a research. Instead, the potential benefits to the participants can be explained in terms of the results from the study. It is important that the researcher includes community dissemination in the research plan and to share the findings in a workshop at the end of the research. Sometimes, the dissemination of preliminary findings to the community can serve as a validation of the results and will also give an opportunity to participants

to provide further information while clarifying their responses. In circumstances where the results may have a negative impact on the participants, a researcher may share the findings with the relevant authorities. In the African context, for most researchers the entry point to the community may be a respected authority such as an administrative chief who can guide one in the dissemination of the results, and possible a way forward for results that may reveal some harm to the community.

Beneficence: The principle of beneficence brings to the fore the need for researchers to protect the participants from harm and to act in a manner that maximizes benefit while minimizing risk. Research in the social sciences can be considered to have a low risk threshold (Abrams & McMillan, 2016). However, where patients may be involved or situations where blood samples (health related studies) may be required from the participants, there can be considerable risk. In studies that involved, for example, quality of water from boreholes used by a community, results may provide high rates of contamination. It is the responsibility of the researcher to bring this information to the authorities without alarming the participants, since this may be their only source of water. Remedial measures can be taken through the authorities who are usually the entry point at the initiation phase of the research.

In addition, there should be confidentiality of the responses from participants in order to minimize risks. Participants should not be identified by name during interviews in sensitive studies where information on, for example, health status, since this can lead to harm such as stigma from other community members. In situations where the participants insist for their names to be used, it is important that the names are kept confidential. The participants should be free in providing information knowing that it will be used in confidence and only for academic purposes. Furthermore, the reports from the surveys should not identify the participants by name in such cases. The procedures developed for the research should maintain confidentiality. Issues relating to data integrity are important. Thus, it is unethical to subject the participants to situations in which they do not feel safe during the research process. Indeed, in current calls for research proposals, applicants must articulate how any potential ethical and health and safety issues have been considered and how they will be addressed, ensuring that all the necessary ethical approvals are in place before the project commences and all risks are minimized.

Justice is a principle addressing the 'fairness' in dealing with research participants. There should be equity in distributing risks and benefits in the participant community, as well as between institutions and research partners. The results from a study should be able to provide solutions that benefit the community under investigation: for instance, in the case of quality of water, the same community can

be advised on appropriate methods of the management of water, including treatment and storage, thereby reducing the risk to contamination. Multidisciplinary research projects involving partners from different countries must draw up memoranda of agreement/understanding indicating the benefits, including the intellectual property rights for the researchers and the institutions involved.

Ethical Review

Institutional Review Boards (IRBs) or Ethical Review Committees (ERCs) have been institutionalized in universities and research institutions to ensure that ethical standards, codes and practices are adhered to during the research process. At the national level, the research council sets up statutes to guide the institutions and, thus, ensure standards that are the same across the board. These ethical standards are also in sync with those developed at the international level. The main mandate of the review boards is to evaluate the projects under defined protocols and approve or reject them. The ethical review committees may make modifications to the research protocol before issuance to research permits. A typical evaluation protocol considers aspects such as those indicated in Table 11.4. The ethical considerations have become an important part of the research and need to be included in the proposal from the planning phase.

The review process can be one of these three types based on the level of perceived risk in the study. The *exempt review* applies to studies with minimal risk to subjects and, therefore, will not be subject to government regulations. In the US, generally the chair of the review committee will make the determination of the exempt status. For studies that are classified as *expedited review*, the risk is equally minimal but the level of involvement by the research subjects is greater. The researcher may interview or observe participants using strategies that require interactions and recordings. This level of review will involve some members of the review board. Finally, the *full review* classification of research studies applies to investigations that pose a greater risk to the participants. Research studies involving vulnerable groups like children, prisoners, refugees, patients, victims of abuse and torture etc., require the input of the entire review board in order to sufficiently assess the risk/benefit ratio of the study.

The research protocols must be submitted for consideration, comment, guidance and approval to the concerned research ethics board before a study begins. The committee has the right to monitor the research and at the end of the study, the researchers must submit a final report with a summary of the study findings and conclusions.

Table 11.4: Evaluation Protocol for Ethical Review Committees

- Scientific design and conduct of study
- Recruitment of research participants
- Care and protection of research participants
- Protection of research participant's confidentiality
- Informed consent process
- Community considerations

Source: Self-generated by the Author

Professionalism

Professionalism encompasses responsible and ethical conduct of a researcher. In this regard, three main issues are discussed: (1) conflict of interest, (2) accuracy, and (3) intellectual property (IP) rights. Researchers should declare conflict of interests during review of research projects and of other academic papers and should ensure that they report results as accurately as possible. In addition, researchers should protect intellectual property emanating from the research. Lack of professionalism is a major form of research misconduct and can be a result of lack of leadership and pressure to complete the research or publication.

Conflict of Interest: A conflict of interest in research exists when an individual has interests in the outcome of the research that may lead to a personal advantage and that might, therefore, in actuality or appearance, compromise the integrity of the research (NAS1995). Conflicts of interest can occur in situations where a researcher is called upon to review grant proposals or manuscripts for publication. A reviewer should be able to declare the conflict of interest to the administrator of the grant or editor and explain before reviewing and, of course, confidentiality must always be maintained. Generally, the guidelines for the review process usually provide procedures for declaring a conflict of interest.

Accuracy: Researchers must always report results in an accurate manner. As indicated earlier, good research requires patience and sometimes disappointment and discouragement may occur when the expected results do not materialize. The planned activities may also be interrupted, thereby affecting the expected results. A researcher has the obligation to explain the results from the collected and analyzed data, rather than altering the data and results. The pressure to 'publish or perish' or for promotion at the university has sometimes led researchers to report only the

expected results and omit results that do not fit well with the norm, which could lead to 'perishing'. According to Wright (2016), the increasing pressure to publish may encourage some authors to misreport their data, while the rapidly growing development of statistical techniques have made it (a) more likely that authors may incorrectly apply a particular technique and (b) more difficult for reviewers and editors to identify when either of the above has occurred.

*Intellectual Property Rights***:** Intellectual property rights (henceforth, IPRs) are the protections granted to the creators of intellectual property (henceforth, IP), including patents, copyrights, trade secrets, new plant varieties, utility models, and industrial designs. An IPR policy considers IP as well as issues related to collaboration, confidentiality in material transfer, disclosure on inventions, distribution of revenues, and disputes (KU 2010). It is noted that often research students are not aware of the IP laws and plagiarism, or the penalties of plagiarism (Cheema et al 2011). Regarding IPR, three main issues are discussed here: (1) authorship,(2) plagiarism, and (3) data fabrication.

Authorship: Research is incomplete until published, and it is the desire of every researcher to publish in a credible journal. There are several issues that need to be considered for the authorship, such as 'Who should be an author?' There are significant responsibilities in publishing, including accurate, complete, clear, and unbiased representation of the research. An author should only be listed if s/he has made substantial contributions to the conception and design, acquisition of data, or analysis and interpretation of data; drafted the article or revised it critically for important intellectual content; and approved of the final version to be published. It is common practice that the main author has made the most contribution to the article than the subsequent co-authors. Most journals require an indication of the individual role and contributions of each author. Other members may be acknowledged for collecting data or entering data for analysis and may not warrant being listed as authors.

Researchers involved in collaborative research should always state the roles, responsibilities, and order of the authors. Where there is equal contribution, then the alphabetical order can be used. Other unethical practices include instances where the supervisor/professor claims to be the principal author for a publication from a student's thesis/dissertation. This practice is discouraged, and with proper mentoring, such cases should be on the decline. Shisanya and Munene (2017, Chapter 12 in this handbook) provide the art, science and politics of publishing.

Plagiarism is the use of another person's original work without giving him/her due credit. There are many forms of plagiarism, the most common being

copy and paste. Plagiarism is a theft of IP and is unethical since it undermines scientific integrity, contribution to knowledge and one's integrity. Much literature now exists on the prevalence of plagiarism in all disciplines including biomedical science (Baždarić et al. 2014; Cheema et al. 2011). *Plagiarism*, *self-plagiarism* and *data fabrication* (falsification) are major forms of research misconduct. Self-plagiarism exists in instances where a researcher reuses portions of his/her own work without acknowledging it in another work.

Researchers should be cautious in citation of literature to avoid plagiarism, deliberate or otherwise. One should check: Does the writing provide appropriate credit to previous work? Is the work written in your own words as an author? Of course, it is increasingly becoming more difficult to recognize, and what constitutes plagiarism is becoming more difficult. The White Paper on The Plagiarism Spectrum provides instructor insights into the ten types of plagiarism (Lancaster and Clarke 2014). Software exists for checking for similarity to other cited works. These can be used by the authors to enhance their writing skills, particularly where the researcher can identify areas where citing the sources may have been omitted. Researchers are advised to be cautious when using any of the existing software.

A good researcher should be able to acknowledge all the sources of the work used in a report using the recommended citing styles. Furthermore, s/he should disclose any information that could lead to conflict of interest. Indeed, a good report should also build on existing works, so that a researcher does not exaggerate his/her research findings.

Data Fabrication is a serious misconduct that involves making up data or results and recording or reporting them or failing to report data that contradict expected results. It can also be selective reporting, negative or detrimental studies not published. In addition, the research materials, equipment and processes may be falsified or manipulated in what is usually referred to as 'cooking data'. Or a researcher may omit data records to obtain certain results, by the donor. Human error also contributes to loss of data integrity. Data integrity is the assurance of accuracy and consistency of stored data, indicated by an absence of any alteration in data between two updates of a data record. Researchers should also strive to answer specific questions and not just collect or mine data. Furthermore, statistical issues such as sample size and methods of sampling are an important part of a research design which ensures that the research data are likely to accurately answer the question(s) posed. Issues relating to data acquisition, management, sharing, and ownership should also be considered in relation to IP.

Conclusion

Research integrity is an important aspect of the moral character and experience of any researcher or institution. It involves, above all, a commitment to intellectual honesty and personal responsibility for one's actions and to a range of practices that characterize responsible research conduct. Good quality research provides objective and accurate results that can contribute to societal development. Thus, researchers should be aware and adhere to the code of ethics or guidelines, including procedures for obtaining research permits. Furthermore, there is institutional responsibility in maintaining research integrity which should include a culture of compliance, training and policy environment. All research institutions have an obligation to address allegations of research misconduct. Institutions should also have processes and procedures to investigate misconduct and mete out justice as is appropriate. It is the duty of a researcher to conduct research in a way that earns and maintains public confidence in his/her integrity, and to inform of incidences of research misconduct.

Indeed, the mentoring process provides a good avenue for promoting responsible conduct of research and reducing the risk of research misconduct. Research students should grow with the knowledge of ethical and responsible research. Through the mentoring process, the young upcoming researchers can be encouraged to understand and apply the frameworks that influence a research project in terms of the ethical principles, the laws and legal requirements, the application of the ethical principles, the role of the review boards, and the professionalism required in conducting responsible research.

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