# Essentials of Grant Writing in Medical Research: Opportunities and Challenges

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## ABSTRACT

**Introduction**: Grant writing is a crucial skill for researchers seeking financial support for their projects. It involves crafting a compelling proposal demonstrating a project's value, feasibility, and societal relevance.

**Objective**: This paper aims to provide an overview of grant writing, including types of grants, steps in application, and strategies for effectively presenting research ideas. Also, challenges and solutions for successful grant proposal writing, emphasising the importance of structured planning and effective data visualisation techniques are presented.

**Methodology**: Using Nepal's research funding scenario as a backdrop, this manuscript is based on the articles published in the peer-reviewed literature, and the author's experience of working as a grant reviewer for several organisations for over a decade. Practical examples and insights into the nuances of grant writing are included to guide researchers, particularly in resource-constrained settings like Nepal.

**Result**: Information about grant and grant writing, funding organisations, their mode of awarding grants, steps of writing grant proposals, and dos and don'ts of grant proposals are elaborated in this review.

**Conclusion**: Crafting an effective grant proposal is an iterative process that can be developed through practise and persistence. Familiarity with research methodologies, combined with guidance from an experienced mentor, plays a crucial role in successfully writing and securing funding for research projects.

**Key words**: Funds; grants; proposal; research.

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## INTRODUCTION

Grants are essential monetary resources provided to individuals or organisations for research purposes. These funds facilitate groundbreaking studies and contribute to advancements in knowledge and practice. Grants are crucial, particularly for those in academia or non-profit organisations. Grant-making institutions known as *grantors* are foundations, corporations, and government agencies. Grants usually have very specific guidelines on what the money can and cannot be used for and the rules for how the 'winner' of the grant or *grantee* will be chosen. Obtaining grants is highly competitive, requiring meticulous planning, persuasive communication, and adherence to strict guidelines. Grant writing, the act of preparing applications to secure funding, is a complex process. However, skills to write grants can be taught and learned and is an important excessive for career development for the early stage researchers (Files et al., 2020). A high-end grant proposal should not only demonstrate the worthiness of a project but also highlight the competence of the researcher and their team (Liu et al., 2016). In addition, it should be feasible in terms of time, and resources, and be ethically compliant. This paper aims to provide the essentials of grant writing, including types of grants, the process of applying, key components of a grant proposal, and other supporting resources providing a practical roadmap for researchers, especially those in developing countries like Nepal.
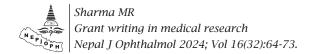
## RESEARCH FUNDING IN NEPAL

The research landscape in Nepal presents distinct challenges, including limited financial resources, bureaucratic hurdles, and a suboptimal infrastructure for supporting large-scale research projects. Though opportunities were limited in the past, there are growing initiatives aimed at enhancing research capabilities and securing funding from both national and international sources. A previous publication on this topic by the team led by this author highlights the funding organisations that provide funds for Nepali researchers (Sharma et al., 2024). Briefly, national organisations that provide grants are the University Grants Commission (UGC) Nepal, Nepal Health Research Council (NHRC), Nepal Academy of Science and Technology (NAST), and local universities whereas international organisations include entities like the World Health Organisation (WHO) and the Research Council of Norway among others ('The UGC Research Guidelines, 4th Ed', 2024;; Nepal Academy of Science and Technology (NAST), 2024; The Research Council of Norway, 2024; WHO Research grants, 2024). The researchers should be well-versed in this area to identify suitable funding opportunities for their research projects.

### Types of Grants

Grants can broadly be categorised into private and public funding sources. Private grants typically originate from non-governmental organisations, philanthropic foundations, or corporations. These grants often are of specific interests or thematic areas dictated by the funding body. Public grants, on the other hand, are provided by government institutions with a focus on promoting research aligned with national or global priorities. Understanding the type of grant being pursued is crucial for tailoring applications effectively.

## What is Grant Writing?

Grant writing is the act of preparing an application to receive funding for a project. It can be a daunting task requiring specific skills and processes but can be learned like any other subject. (Joss-Moore et al., 2018; Smith et al., 2022; Oxford et al., 2023) However, the prerequisite is that one should have a solid foundational knowledge of research methods.

## GRANT WRITING STEPS

Although a grant proposal can be written in many ways, a systematic approach enhances the likelihood of success. The process can be broken down into several key steps:

1. **Selecting a Topic**

   The topic selection process has two pathways:

   o Researchers with predefined projects must identify funders whose priorities align with their proposals.

   o Those without fixed ideas may choose topics based on the priorities of potential funding agencies.

While selecting a topic, a manageable, realistic issue with significant societal impact should be chosen. Projects that are very difficult to achieve with unrealistic goals like, "Eradicating Typhoid in Nepal" are likely to be rejected.

2. **Identifying Funding Opportunities**

   The next step is to identify the organisations that will potentially fund your research. You need to understand their objectives and make sure their interests are in alignment with the proposed study. Different grants have distinct eligibility requirements, such as restricting applications to certain institutions, professions, or geographic locations. For instance, UGC Nepal may only cater to academic institutions, while NHRC accepts applications from broader demographics. Also, the researchers should thoroughly investigate the funder's priority areas, funding history, and eligibility criteria for you or your organisation.

   In Nepal, key organisations that provide funds for the various categories of research are as follows:

   o **National Organisations**: Examples include UGC Nepal, NHRC, NAST, Tribhuvan University, and other universities and academies.

   o **International Organisations**: Entities like the WHO, the Research Council of Norway, the UK-based National Institute for Health and Care Research (NIHR), and the United States (US)-based National Institute of Health (NIH) provide opportunities for broader collaborations (Homepage | NIHR, 2024; National Institutes of Health (NIH), 2024).

3. **Reviewing Application Guidelines**

   Once the organisation is finalised and confirmed that both you and your project meet the application criteria, it is essential to carefully review the instructions to fully understand the application requirements. The materials to be collected, prepared, and

submitted, along with the required level of innovation and whether the project is institution-specific or collaborative, will be determined by the funder's guidelines.

### 4. Drafting the Proposal

Create a well-structured draft that includes essential components: a clear statement of the problem, rationale, methodology, timeline, and budgetary details.

### 5. Submission

Ensure timely submission, adhering strictly to the guidelines regarding formatting, length, and supplementary documents.

### 6. Presentation

Some grants require oral presentations. Prepare effectively to articulate the research objectives and significance convincingly.

### 7. Implementation and Reporting

Upon approval, execute the research project diligently and submit periodic reports to demonstrate progress and accountability.

## COMPONENTS OF A GRANT PROPOSAL

A grant proposal is a structured, formal document that details what (proposed research topic), why (its worthiness), and how (your plan of execution) of your project. The objective is to assure funders that your research project is both valuable and impactful, demonstrating that you have the expertise, sampling units, and resources needed to complete it. Additionally, you must show that the research is feasible within the proposed timeframe, adheres to ethical standards, and offers societal benefits, ensuring their investment is not wasted. It comprises the following key elements:

### 1. Project Title

As the title gives the first impression to the reviewers, it should be constructed with all the essential elements of a good research title (Grant, 2013; Soni, 2023). It should be unambiguous, concise, and attention-commanding. In all analytic studies, it should be stated as a relationship between independent and dependent variables. Acronyms are best avoided unless they are used as normal words, such as AIDS. The number of words should be restricted to 10-15. Avoid tiles with emotional appeal. A practical tip for the title is to begin with a working title and revise it as needed once the proposal is complete, ensuring it accurately reflects the content and focus of the project.

### 2. Summary of the Project

The summary provides a one-page snapshot of the project. It should stand alone outlining the research objectives, methods, and expected outcomes. Although this section is typically placed before the main body in the submission, it is usually written last to ensure it more accurately represents the content and essence of the entire proposal.

### 3. Project Description

#### a. Introduction

This section outlines existing knowledge identifies gaps, and establishes the importance of the research. Write answers to these questions:

- What is known about the topic?

- What is yet to be known/solved?

- Why solving this problem is important?

Simply repeating similar projects from the recent past is unlikely to be approved.

### b. Rationale and the Statement of Need

Clearly articulate why the project is necessary and what societal needs it will address. Hard data should support these arguments, avoiding emotional or anecdotal appeals.

- Why are you proposing this particular project?

- What needs will it address in your community or country? Common examples are ways to control dengue, methods to decrease road traffic accidents, ways to mitigate climate change, etc.

### c. Objectives

Here the researcher should write the realistic goals for the project. Objectives should be written following the SMART criteria (Specific, Measurable, Achievable, Relevant, and Time-bound) originally proposed by Doran in 1981 (Doran, 1981). It is important to connect them back to the statement of need.

### d. Methodology

This is a crucial step in the grant proposal (Engberg and Bliss, 2005). This section should consist of a step-by-step description of how things will be carried out with an appropriate and realistic timeline. This should encompass the study site and its justification, study design, inclusion/exclusion criteria, sample size and basis of the calculation, data collection methods, and statistical analysis plans. A well-justified methodology ensures the credibility of the proposal. Research design is the blueprint of your project and should be carefully chosen to best answer the research question. As the sample size is a key determinant of budget and study feasibility, it must be statistically justified including power of the study, level of significance, etc. All proposed statistical tests should be mentioned depending on the types of data. Proposals should avoid ambiguous statements like "appropriate tests will be applied." Instead, clearly define planned analyses. You should have a reasonable knowledge of biostatistics but if the project is complex, it is advisable to have a qualified statistician on the team. If the research demands the use of research tools, only validated ones should be used. It is not mandatory for the Principal Investigator (PI) or Co-Principal Investigator (Co-PI) to personally collect data. Hiring research associates for data collection is acceptable, provided they receive proper training before heading to the field.

### e. Ethical Approval:

Although describing the ethical issues in detail is beyond the scope of this review, the proposal must adhere to the principles of responsible research conduct, including compliance with the Declaration of Helsinki and the three core ethical principles outlined in the Belmont Report: respect for persons, beneficence, and justice. (Beauchamp, 2020; 'WMA - The World Medical Association-WMA Declaration of Helsinki – Ethical Principles for Medical Research Involving Human Participants', 2024) Securing ethical clearance is a prerequisite

for grant approval in medical research. The researcher preferably should have a certificate in ICH-Good Clinical Practice) from a recognised training institution (ICH E6 (R2) Good clinical practice - Scientific guideline | European Medicines Agency (EMA), 1997).

### f. Expected Outcome of Study

This is often erroneously considered synonymous with the result of the current study. In this section, the researcher should indicate how the results of the current research project will refine, revise, or extend existing knowledge in the area under investigation. This is where you need to connect with the statement of need. This should also include how the results of this particular research change the healthcare practice.

### g. Problems Anticipated

No project is entirely free from challenges. Issues such as obtaining adequate sampling units, securing resources, or other unforeseen obstacles may arise. Researchers should proactively outline potential difficulties in completing the project and propose feasible solutions to address and mitigate these challenges.

### h. Limitations and Delimitations

Limitations are influences that are beyond the researchers' control whereas delimitations describe the boundaries that a researcher sets (Theofanidis and Fountouki, 2018; Sharma, 2021). These will have implications for the interpretation and generalisability of your research results. Properly acknowledging limitations demonstrates honesty in your work

and an understanding of its implications. Clearly describe each limitation in concise terms, explaining why they were unavoidable. Avoid listing too many limitations or delimitations, as this may imply that you have not fully considered the feasibility of your study.

### i. Budget

A budget is a quantitative expression of a financial plan for the project. A detailed item-wise breakdown of the funds required for the project, along with a justification of each item should be mentioned to ensure transparency and feasibility. Any source of funding, if already obtained to supplement the cost, should be explicitly mentioned. Submitting an unrealistic budget, whether it is overestimated or underestimated, is strongly discouraged.

### j. Dissemination of Results and Publication Policy

The dissemination of results should be carefully planned to ensure that the results are effectively communicated and understood by the target audiences, considering the research settings. Generally, the funding organisations specify how it should be done- official submission of the final report and/or publication in a journal recognised by the organisation. Also, a clear description of publication policy specifying the number and order of authorship and their role while complying with the International Committee of Medical Journal Editors (ICMJE) criteria is needed to avoid hurt feelings in the future (ICMJE; 2024). A clear publication policy adds value. The investigators can also present at nationally or internationally recognised specialty or multispecialty conferences, as this

| Activities | Jan | Feb | Mar | Apr | May | June | Jul | Aug | Sep |
|---|---|---|---|---|---|---|---|---|---|
| Literature review | ░ | ░ | ░ | ░ | ░ | ░ | ░ | ░ | |
| Topic selection | ░ | | | | | | | | |
| Proposal development | ░ | ░ | | | | | | | |
| Proposal presentation | | | ░ | | | | | | |
| Data Collection | | | | ░ | ░ | ░ | | | |
| Data Analysis | | | | | | | ░ | | |
| Report drafting | | | | | | | ░ | ░ | |
| Dissemination of findings | | | | | | | | | ░ |

**Figure 1. Example of a Gantt chart (from Sharma MR. Principles of Health Science Research, 2021)**

provides a platform to share findings with a broader, relevant audience and gain valuable feedback. The research results should not be announced in the lay media as the chances of distortion of the meaning are high.

k.  **Work Plan**

This section should describe how you intend to complete your research project based on a realistic and achievable timescale. All activities across the different phases of the research should be outlined according to the anticipated timeline, taking into account any dependencies between tasks. It is important to identify which activities must be completed before others and which can be done concurrently to ensure efficient project progression. A Gantt chart (Figure 1) is commonly used for this purpose (Clark et al., 1922; Sharma, 2021).

**l. Supporting Documents**

Including the resumes of the PI and Co-PI, letters of support from institutions, and

examples of prior work significantly strengthen the proposal. Supplementing your statement of need and projected impact with additional research will further enhance the proposal's credibility. For the PI and Co-PI resumes, highlight your academic background, research experience (particularly previous work funded by reputable organisations), relevant training and certifications, and publications related to the proposed project. A letter of support from your institutional head further affirms your organisation's capability to successfully execute the project.

**KEY CONSIDERATIONS IN GRANT APPLICATIONS**

Successful grant applications require attention to several critical factors to obtain a polished final project (Colwell et al., 2005; Liu et al., 2016; Files et al., 2020; Chan and Hart, 2023):

● **Qualifications**: Demonstrate expertise through education, experience, and prior training. Highlight the research team's

capability to conduct the study. These include the execution of similar projects in the past, publications of articles, ability to work in a team, proof of leadership skills, etc.

- **Institutional Support**: Show that the hosting organisation or hospital can provide adequate facilities and participants. This includes but is not limited to the reputation of your institute as a research organisation.

- **Relevance and Novelty**: Propose topics that address pressing healthcare issues, align with national priorities, or introduce innovative approaches.

- **Clarity and Precision**: Use concise and clear language to present methods, objectives, and statistical approaches. Avoid redundancy or unnecessary complexity.

- **Organisation and revision:** Proper organisation ensures that your ideas are presented clearly and logically, making it easier for reviewers to understand your project. The revision process refines the proposal to make it more concise, coherent, and persuasive.

## CHALLENGES

Writing a compelling proposal is time-intensive and mentally demanding. Grant writing poses several challenges, including:

- **Organisation**: Structuring the proposal to flow logically and persuasively.

- **Audience Awareness**: Tailoring the proposal to meet the expectations of diverse reviewers.

- **Effective Visualisation**: Selecting and designing visuals that complement and enhance the narrative.

- **Eligibility and Guidelines**: Adhering to funder-specific requirements.

- **Team Competence**: Demonstrating the team's expertise and capability through past work

Overcoming these challenges requires practice, attention to detail, and supervision from experienced colleagues or mentors.

## COMMON PITFALLS

Several caveats can undermine the effectiveness of a grant proposal:

- **Unrealistic Goals**: Avoid selecting overly ambitious projects that are infeasible within the proposed timeframe and resources. Do not make unfounded statements or rely on clichés.

- **Emotional Appeals**: Keep the tone professional, avoiding exaggerated claims or overly dramatic language.

- **Overuse of Jargon**: Use accessible language to ensure understanding across diverse review panels.

- **Missed Deadlines**: Submit applications on time, allowing room for revisions and unforeseen delays.

## CONCLUSION

Grant writing is an iterative process requiring patience, practice, and a strategic approach. Researchers should begin preparations early,

focus on creating clear and concise proposals, and continuously refine their skills. While challenging, grant writing becomes manageable with experience and offers a pathway to advancing scientific knowledge and societal progress. For researchers in Nepal and similar contexts, mastering grant writing is particularly critical, given limited funding resources and heightened competition. By following structured approaches, avoiding common pitfalls, and utilising effective visualisation techniques, researchers can significantly enhance their chances of securing funding.

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