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Transforming the Clinical Trials Ecosystem in Ethiopia

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CDT-Africa: Center for Innovative Drug Development and Therapeutic Trials for Africa

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» To deliver quality postgraduate education

» To build collaborative research capacity to address the development challenge posed by poor access to medicines (drugs, vaccines and diagnostics).

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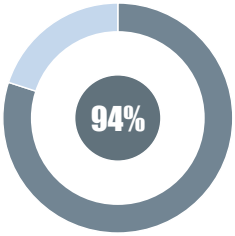
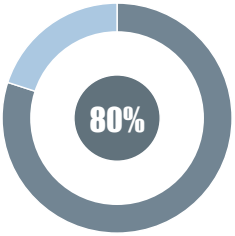


Essential medicines imported



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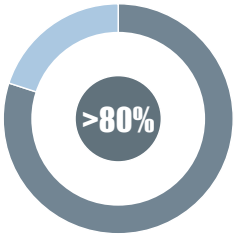

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The Ethiopian Medical Journal is the official quarterly publication of the Ethiopian Medical Association. It is devoted to the advancement and dissemination of knowledge pertaining to medicine in Ethiopia and other developing countries.

ETHIOPIAN MEDICAL JOURNAL
June 2025

EDITORIAL

ORIGINAL ARTICLES

BRIEF COMMUNICATIONS

PERSPECTIVE

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Editorial

Strengthening Ethiopia's Clinical Trial Ecosystem: Challenges, Opportunities, and the Way Forward

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A clinical trial is a study conducted with human volunteers in clinical settings to develop new therapeutic interventions for future generations. Although Africa hosts 19% of the world's population and bears 25% of the global disease burden, only 2.5% of all global clinical trials are conducted in Africa (1). This contrasts with the number of trials registered in Europe, America, and the Western Pacific, which has increased at a much higher rate. For example, the number of trials registered in the Western Pacific was about 14 times higher than that in Africa (2). Nevertheless, Africa has tremendous potential for developing new interventions due to its large biodiversity, disease epidemiology, pathogenic profile, and populations with diverse genetic makeups (3).

Ethiopia is the 2nd most populous country in Africa with about 127 million people (3, 5) and 10th in the world (6, 7). Unfortunately, the number of clinical trials conducted in Ethiopia is tiny compared to its large population. For example, just 145 clinical trials were registered from Ethiopia until November 2016 compared to the enormous number of clinical trials registered in Egypt and South Africa (8). Although the registered trials have tripled since then (9), the number remains relatively small. This low rate of clinical trials is attributed to the unfavorable clinical trial ecosystem, which has not provided a fertile ground for conducting clinical trials in the country. However, there is considerable potential for the conduct of clinical trials in the country. In addition to the population size and disease profiles, there is an increasing number of trained and qualified personnel in the various health disciplines, including in clinical trials, who can be engaged in clinical trials. Moreover, different stakeholders of clinical trials, including academic and research institutes, trained clinical monitors, experts who can be employed as members of the data safety monitoring board, accredited research ethics review committees, a strong National Medicine Regulatory Authority, and insurance companies that have adequate awareness of clinical trials, are available. There are a large number of potential traditional medicinal remedies that could be subject to clinical trials in the country. These tremendous opportunities have not been tapped sufficiently due to the weak clinical trial ecosystem.

A lot of effort has been made to promote clinical trials in Ethiopia in the past few years. The Center for Innovative Drug Development and Therapeutic Trials for Africa (CDT-Africa), Addis Ababa University, has developed a Master's program in Clinical Trials, which has received international accreditation since 2023. Several cohorts of professionals from Africa, including Ethiopia, have been trained in this program. This program has, no doubt, addressed a vital bottleneck, human capital, for the conduct of clinical trials. The center has also developed an internationally accredited ten-week online course in clinical trials, which is expanding capability in clinical trials across Africa (10). CDT Africa also took the initiative to establish an advisory committee on clinical trials (ACT) involving the Ethiopian Food and Drug Authority (EFDA), National Research Ethics Review Board (NRERB), and Institutional Research Ethics Review Committees (IRERCs) of the College of Health Sciences (CHS), Addis Ababa University, Armauer Hansen Research Institute (AHRI), and the Ethiopian Public Health Institute (EPHI). An effort is being made to expand the committee's membership to institutions active in clinical trials across Ethiopia. This committee has terms of reference (ToR) and meets regularly to discuss issues related to improving the ecosystem for conducting clinical trials.

As part of its advocacy work, the ACT has celebrated International Clinical Trials Day (ICTD) every year since its establishment to enhance awareness regarding clinical trials. The financial support obtained from several funding

organizations such as drugs for Neglected Diseases initiative (DNDi), European and Developing Countries Partnership (EDCP), Welcome Trust, US National Institute of Health (NIH), the Bill & Melinda Gates Foundation and UK National Institute of Health Research NIHR) have helped improve the clinical trial ecosystem in Ethiopia. The recently approved Clinical Trial Roadmap by the Ministry of Health has also contributed. All these efforts are beginning to show promising results in improving the clinical trial ecosystem in the country.

As part of its broader effort to improve the clinical trials ecosystem, the ACT conducted a study of the country's clinical trials ecosystem. The study identifies many opportunities and challenges for conducting clinical trials. This supplement presents the findings from this study in the hope that more stakeholders will be aware of them and join hands to improve the clinical trials ecosystem.

There is much to be done to meet the demand for access to therapeutics for the Ethiopian population by promoting clinical trials systematically, including facilitating the safe use of untapped resources and traditional medical knowledge. This requires the collaborative efforts of all concerned parties. The Ethiopian government has made clear commitments to improve the clinical trials ecosystem. One important step in this regard is the establishment of a dedicated new executive office, equivalent to a directorate, responsible for clinical trials and pharmacovigilance (11). These initiatives should be encouraged. Timely revisions and implementations of clinical trial policies are also important. This editorial highlights the active initiatives for enhancing the clinical trials ecosystem of Ethiopia and encourages wider and stronger engagement and commitment from more stakeholders. In this regard, partnerships with industry will play a critical role in improving the clinical trials ecosystem and enhancing clinical trial standards. The series of papers published in this special issue further highlight the opportunities, challenges, and remedies for strengthening the clinical trials ecosystem of Ethiopia.

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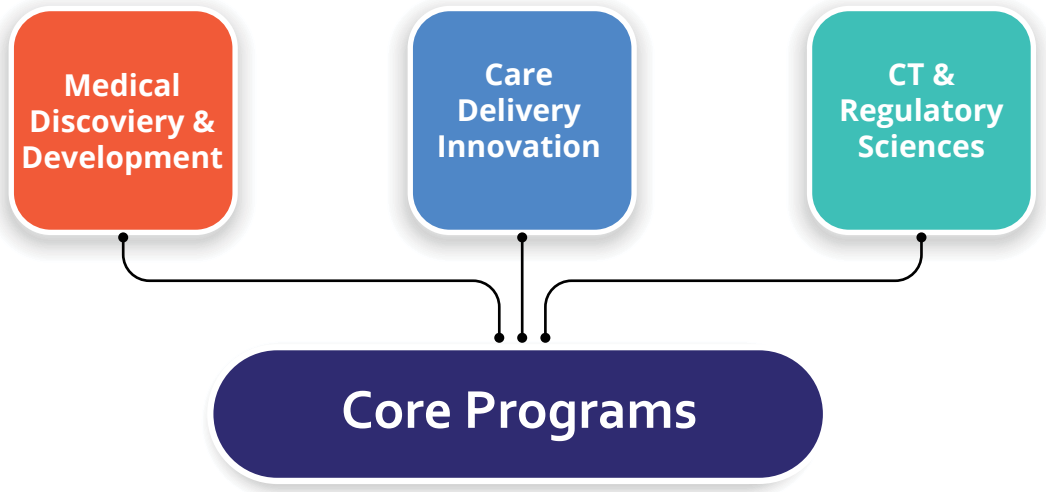
CDT-Africa

Core Fuction: Building Africa's medical discovery and development capabilities



Priority & Programs

Disease focus area are those with high unmet need in Africa that are under-addressed by the global biomedical research and pharmaceutical R&D ecosystem. Cancer included as a neglected disease in the region.

- 1 Masters in Clinical Trials programme (Internationally accredited)
- 3 PhD fellowship tracks, 4 postdoctoral fellowship tracks
- 1 Virtual advanced certificate short course- ClinOps (Internationally accredited)
- 10 skills based short courses
- Grassroots initiatives to improve innovation and science leadership
- 30+ translational Projects

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CDT-Africa enjoys semi-autonomous status and the full support of the Addis Ababa University as well as the Ministry of Education. We value all partners and treat them with utmost respect, and work with them for mutually beneficial outcomes. We ensure public accountability and transparency through scientific and public feedback and stringent activity, financial and procurement auditing and reporting mechanisms.

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Mesfin et al

Original Article

Clinical Trials Ecosystem in Ethiopia: A Qualitative Study of Stakeholder Views on Strength, Opportunities, Challenges and The Way Forward

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Abstract
Background: *Ethiopia's participation in clinical trials remains low. This study aimed to investigate the challenges and opportunities associated with conducting clinical trials in Ethiopia.*
Method: *This study employed a qualitative, exploratory design. Seventeen purposively selected clinical trial stakeholders participated: clinical trial investigators (n = 6), ethics review board members (n = 8), regulatory authority officials (n = 2), and an insurance company officer. Data were collected through in-depth interviews, which were audio recorded, transcribed, and analyzed thematically.*
Results: *Four themes were identified: (1) system of protocol approval, (2) investigator motivation, strengths, and opportunities, (3) challenges, and (4) recommendations on improving the clinical trial system. The potential impact and opportunities of clinical trials were the main motivating factors for investigators to engage in clinical trials. The availability of trial sites, patient recruitment potential, and recent interest of insurance companies were mentioned as the main opportunities. There was a bigger preoccupation with the challenges, and five groups of key challenges for conducting clinical trials were identified. These included the limited financial, infrastructural, and human resources, leading to a slow trial approval process. Investigator-related factors, including incomplete submissions, low protocol quality, delays in responding to reviewers' comments, and engagement in high-risk trials, were also identified.*
Conclusion: *Ethiopia offers promising foundations and opportunities for conducting clinical trials. However, many challenges prevail at every level. To harness the opportunities, stakeholders need to address the main challenges, namely addressing structural issues (resources, infrastructure, and harmonization) at both national and institutional levels, speeding up the approval process, and building broader clinical trials capacity.*

Keywords*: Clinical trial, Challenges, Opportunities, Clinical trial ecosystem, qualitative, Ethiopia*

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Introduction

Clinical trials are critical for establishing a high-quality evidence base for clinical practice, health system improvements, human and infrastructure development in healthcare, and rational allocation of resources (1). The global importance of expanded clinical trial capacity, as well as its challenges, was demonstrated during the recent COVID-19 pandemic. While the pandemic required large-scale trials and partnerships with new approaches, such as decentralized clinical trials (2), clinical trial quality and coordination were challenged (3). The pandemic also exposed the glaring inequity where the fragile healthcare system, poor infrastructure, and limited human capacity meant the limited participation of low-income countries in clinical trials (4). Participation of low-income countries in drug and vaccine trials, as well as compliance of studies from low-income countries with regulatory requirements, was significantly low (5). Despite such challenges, the pandemic has prompted countries and regions to prioritize ensuring sustainable access to healthcare, including improvements in clinical trial ecosystems. The relevance of regional entities, such as the African Medicines Regulatory Harmonization, has been enhanced. In individual countries such as Ethiopia, there have been attempts to expedite ethics and regulatory approvals in response to the pandemic.

Beyond the opportunity to close contextual evidence gaps often overlooked by international clinical trial undertakings (6), clinical trials provide opportunities to uncover the varying effects of interventions arising from genetic, environmental, nutritional, or biological strain variations (7, 8). The economic capacity of these countries demands robust evidence for affordable health services and interventions (9). Infrastructure and human capacity advancement prospects could also serve as a catalytic role in developing institutional research capacity (10). In addition, while not a priority, the growing expansion of international sponsors and the pharma industry has economic repercussions. The estimated median cost of trials in the United States generally ranges from $3.4 million (for Phase I) to $21.4 million (for Phase III) (11). The positive effect on human health expenditure savings on society will also be reflected in the national economy. In a study conducted in the United States, the projected net benefit to society from only 28 Phase III trials within a 10-year period was $15.2 billion (12).

Ethiopia is one of the most populous countries in the world, ranked 10th globally and 2nd in Africa, representing 1.62% of the global population and 8.6% of Africa's population (13), with an increasing burden of communicable and non-communicable diseases. However, engagement in clinical trials in Ethiopia remains very low (14, 15). Most clinical trials in Africa are conducted in Egypt and South Africa (16). The reasons for this low rate of clinical trials in Ethiopia have not been explored adequately. In recognition of this, the Advisory Committee on Clinical Trials (ACT) recommended a study to evaluate the existing clinical trials ecosystem, aiming to facilitate an informed discussion and recommendations that would accelerate improvement in the clinical trials ecosystem. ACT was established four years ago to identify the critical gaps and barriers for the conduct of clinical trials and explore ways to improve the clinical trials ecosystem in Ethiopia. The Centre for Innovative Drug Development and Clinical Trials for Africa (CDT-Africa), as a regional medical discovery centre and committed to clinical trials, has taken responsibility for facilitating the establishment and operation of the ACT. Thus, this study aimed to explore the systemic challenges and opportunities of conducting clinical trials in Ethiopia, with the goal of proposing practical solutions.

Materials and methods

Design

A qualitative study employing a phenomenological approach was conducted to explore the system, challenges, and opportunities of conducting clinical trials, examining the experiences of investigators, ethics committees, regulatory authorities, and the insurance industry.

Study settings

The study was conducted in Addis Ababa and regional states with major clinical trial activities (Gondar and Jimma University). Addis Ababa is the capital city of Ethiopia, where national clinical trial oversight bodies and accredited Institutional Research Ethics Review Committees (IRERCs), including the National Research Ethics Review Board (NRERB), are found. The study was conducted from December 2019 to January 2020.

Sampling technique and participants

Participants were purposively selected to include experts from the WHO/SIDCER recognized IRERCs (College of Health Sciences-Addis Ababa University (CHS-AAU), Armauer Hansen Research Ethics Committee (AHRI), and the Ethiopian Public Health Institute (EPHI)), National Research Ethics Review Board (NRERB), the Ethiopian Food and Drug Au-

thority (EFDA), clinical trial experts, and the insurance company. Two participants were included from each research ethics committee and regulatory body. Investigators who have been involved in at least three clinical trials and an insurance company that has recently initiated a pilot service provision were included. The number of participants was determined based on representation and the number needed to achieve theoretical saturation.

Data collection

Specific semi-structured topic guides were prepared for each group of participants. The topic guides explored key questions, including the clinical trial approval process, opportunities and challenges associated with conducting clinical trials, and potential solutions. In-depth interviews were conducted with each participant in Amharic, one of the official working languages of the country. Three experienced researchers (MM, MS, and MM) with backgrounds in clinical trials and qualitative research carried out the interviews. Interviews were audio-recorded and transcribed verbatim for analysis.

Data analysis

Thematic analysis of the data was employed. Initial codes were generated independently by two coders (MS and MM) using two selected transcripts. OpenCode software was used to assist in the analysis. Emerging codes were cross-compared for agreement and resolution of inter-coder disagreements. The codebook was then refined, and the two coders coded the remaining interviews. Themes were created from the final codes generated, and stepwise replication was carried out. Inconsistencies that arose from these separate analyses were addressed. Thematic categories were refined, and conceptual similarities and differences were explored and synthesized. Participant quotes were used to illustrate the themes.

Ethical considerations

Informed consent was obtained after participants were informed of the study aims, the purpose of the interviews, and other elements of consent. The protocol and interview guides have received approval from the Institutional Review Board (IRB) of the College of Health Sciences, AAU (Ref. No. 067/16/Psy). The audio recorded, as well as the transcribed interviews, were identified by codes instead of personal identifiers to maintain confidentiality.

Results

A total of 17 participants were included in the study (Table 1). Among these six were clinical trial researchers; eight were institutional and national ethics committee chairs, secretaries, and members; two were from the national regulatory authority, and one was from an insurance company. Under a third were women, while just over half were trained at PhD level. Among the clinical trial investigators, six were from higher education institutions: four from Addis Ababa and two from universities outside the city. Furthermore, two participants were from research institutes affiliated with ministries. Most participants were senior scientists with a minimum of 6 years of experience, extending to 40 years. All were involved as principal investigators. Regarding gender composition, only one of the trialists was female. The representative from the insurance industry was a department director at an insurance company that had begun providing coverage for a few clinical trials.

Table 1: Characteristics of participants

Characteristics	Number	Percent
Sex		
Male	12	70.6
Female	5	29.4
Qualification		
MD	2	11.8
MSc	6	35.3
PhD	9	52.9
Years of Experience		
1-5	5	29.4
6-10	5	29.4
11-15	3	17.7
15+	4	23.5
Role		
Clinical Trial Researcher	6	35.3
Ethics Board Member	8	47.1
Regulatory Agency	2	11.8
Insurance Company	1	5.8

Four themes were identified: The overall clinical trial approval and regulatory system, Aspirations and opportunities, Challenges, and Recommendations on the way forward.

Theme I: The overall clinical trial approval and regulatory system

The overall clinical trial approval and regulatory system was related to the mandate of approval agencies, level of approval, and procedures (Figure 1). The approval process involves three layers: Institutional Review Boards (IRB)– often preceded by department-level approval and referral – the National Research Ethics Review Board (NRERB), and regulatory approval by the

Ethiopian Food and Drug Authority (EFDA). In terms of scope, while IRBs review all types of studies conducted in their respective institutions, the NRERB is mandated to review institutional or non-institutional studies involving multi-center collaborative studies, clinical trials, genetic research, and studies that require the transfer of biological material.

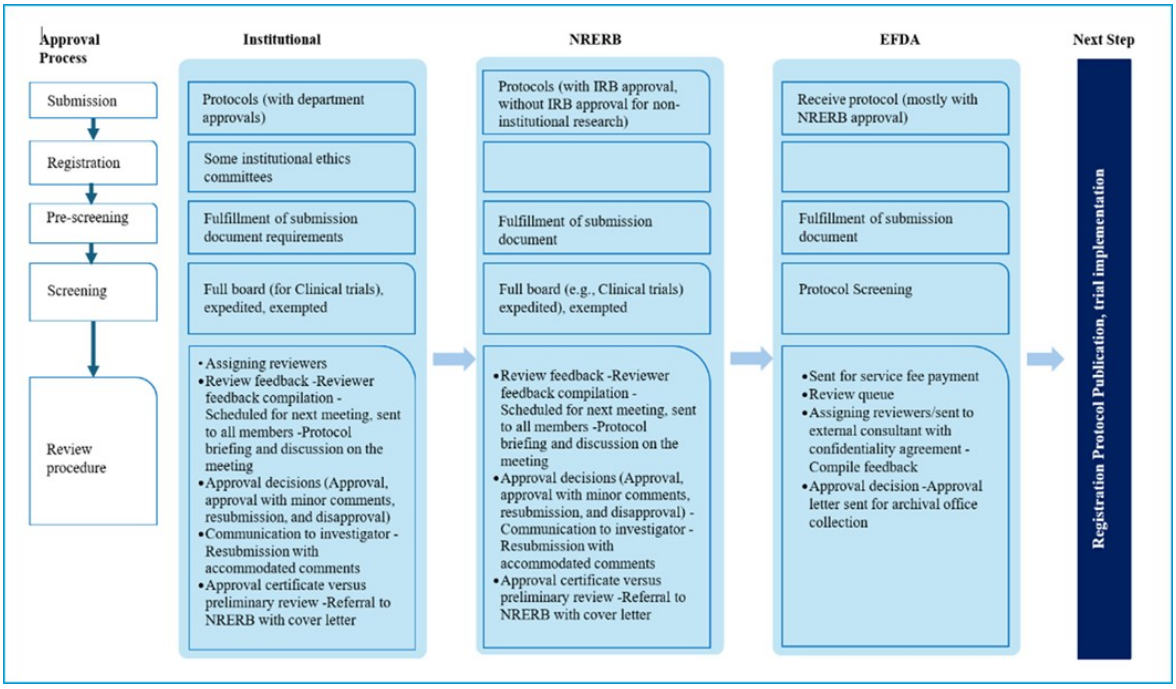

Figure 1: Clinical trial approval levels and processes in Ethiopia. NRERB = National Research Ethics Review Board; EFDA = Ethiopian Food and Drug Authority; CT = Clinical trial

The EFDA is legally mandated to provide oversight of all clinical trials involving investigational products. These include providing approval for trial protocols, monitoring/inspection of trial site, suspending or terminating trials which have safety concerns/violations, and requiring periodic/event-based/closeout reports for all. The IRERC is also mandated to conduct preliminary review, approve protocols, and follow up on adverse events. On top of these activities, EFDA is further mandated to approve investigational product (IP) importation, monitor IP disposal, and evaluate clinical trials result before dissemination, while NRERB is further mandated to approve the transfer of biological material.

The most extended time period indicated in the guidelines for obtaining clinical trial approval is 60 days for most IRERCs and NRERB, and 90 days for EFDA. However, from their experience, investigators noted that the minimum approval duration was six months.

Investigators described the approval process as follows.

> "*The ethical approval works at different levels. As to my experience, the process begins at the institute level then to science and technology, and finally to EFDA ...the process almost took six months...it is all about identifying the requirements and fulfilling what is needed but there are some challenges.*" CTI 002

> "*...the whole process... [the] hierarchical nature or the steps of the approval process is cumbersome; parallel submission is not allowed as you know. Getting institutional support as well as approval is mandatory and not encouraging.*" CTI 001

Theme II: Aspirations, strengths, and opportunities

Clinical trial investigators have indicated that, although they are sometimes frustrated by the challenges they face, most aspire to continue conducting clinical trials. Factors cited to inspire them or keep them motivated were the trial process and the impact, as well as potential opportunities arising from clinical trials. These included the challenging and problem-solving nature of clinical trials; the potential to address treatment gaps; the fact that it is an intersection between research and patient care; the opportunity it presents to build capacity and to the acquisition of wholistic administrative knowledge;

the gratifying result; generation of country-specific and locally relevant evidence and its high impact in changing policy (Box 1).

''In the process of conducting clinical trials, how meticulous you should be and how every detail requires carefulness made me appreciate it. I have seen that it is different from what I have assumed at first and from other customary research'' CTI002.

a. Clinical trials' impact in changing policy
b. Clinical trials offer an opportunity to build human capital
c. The challenging nature of clinical trials, i.e., the need to be resourceful
d. The problem-solving nature of clinical trials and the potential for addressing critical treatment needs
e. The end result of clinical trials, which is the best scientific evidence ("your ability to get high-level/valuable results is gratifying")
f. An intersection between research and patient care – unlike other research methods, it provides the opportunity for clinicians to combine both clinical and research practices.
g. Opportunity for producing country-specific/locally relevant evidence
h. Exposes the researcher to multidisciplinary knowledge and holistic roles, e.g., finance, patient management, and administration.

Box 1: Factors motivating health professionals to be involved in clinical trials

The IRERCs acknowledged that securing international recognition (WHO SIDCER recognition) was an important milestone and a strength. The availability of ethics and regulatory submission guidelines, checklists, and standard operating procedures (SOPs) was also valuable support for the submission process. The motivated and committed members serving on the review process, without financial compensation, were also cited as critical inputs. Regarding their structure and functioning, most have noted that the composition and representation of board members meet international standards. One of the IRERCs has alternative committee members so that scheduled meetings will not be canceled in the absence of regular members. Some, especially IRERCs in research institutes, have strong institutional support and a well-trained secretariat. Government recognition and legal mandate of NRERB and EFDA, respectively, are cited as additional strengths of the national oversight bodies. Participants from EFDA stated that they have created the opportunity to discuss with investigators for further clarification of the protocol.

Members of the IRERCs pointed out opportunities to strengthen their capabilities. They indicated that some have secured grants for capacity building, established connections, or collaborated with IRERCs in other countries. EFDA has already established a separate directorate for clinical trials and pharmacovigilance, consisting of two distinct units for each. The initiation of training on clinical trials at the master's level by AAU was also mentioned as an opportunity. The investigators noted that they had no trouble finding trial sites or facing issues related to patient recruitment. The insurance company representative mentioned that the insurance industry has only recently recognized the business opportunity for providing insurance coverage for clinical trials. However, one reason for the delay in protocol approval is the lack of insurance coverage. Researchers typically purchased insurance coverage from outside Ethiopia. Following recent engagement with insurance companies, researchers have begun to procure coverage within the country.

Theme III: The challenges

Regardless of the investigators' motivation for involvement, the process of conducting clinical trials was regarded as very challenging. There was considerable agreement among investigators on the types of challenges described. The ethics committees, as well as the regulatory authority, described challenges encountered in protocol review and oversight from their end. These challenges are related to human resources, financial resources, infrastructure, institutional/administrative factors, and researcher factors.

Human Resources: From the perspectives of the

ethics committees and the regulatory body, one of the main challenges raised was the shortage of human resources, particularly in terms of reviewers for protocol reviews and conducting regular monitoring and inspections. Occasionally, an expert might be requested to review the same protocol at different tiers of the ethics approval process. The number of secretariat staff was also noted to be not proportional to the workload. For example, one of the IRERCs is staffed by one full-time secretariat personnel. A shortage of human resources was also stated to be a significant challenge for EFDA, the department responsible for authorizing clinical trials, with limited number of professionals assigned to two major case teams (pharmaco-vigilance and clinical trials). Time was cited as the most significant factor contributing to the shortage of reviewers.

> "*Reviewing takes a lot of time and so we take our spare time...for me, I always need extra time to read or review a protocol. Since I don't have a dedicated time for my* IRERCs *related duties I am always obliged to use after hour ... that is the same for all reviewers*." ECC001

Generally, inadequate capability for reviewing clinical trials was an overarching challenge. Participants also noted the high demand for reviewers in some specialties leading to a higher workload on reviewers working in these specialties. Participants also expressed the difficulty of finding chairpersons for review boards due to the demanding nature of the position.

The absence of a dedicated secretariat team was a common issue at the national level. Consequently, a clinical trial is just one of the many competing tasks the team must manage. Although one of the institutional review boards noted that they have a dedicated secretariat, the individual is employed by a capacity-building project, raising questions about sustainability. They also struggle to hire experienced and competent individuals for the demands of the ethics review process, leading to inadequate decision consolidation, insufficient follow-up from reviewers, and widespread delays in convening meetings.

> "IRERC *without a good secretariat is weak and inefficient in a sense that you know as an investigator when you visit the office there should be somebody to discuss to and give appropriate information when you submit your protocol ....in addition, someone who is capable of communicating reviewers' feedback"* ECC01

Frequent staff/secretariat turnover and the inability to build the capacity responsive to the frequency of staff replacement is a shared challenge both from the oversight bodies as well as the investigators.

> "*There is a very high staff turnover in our* IRERC *staff, when we go to the* IRERC *office to check the progress of our protocol review, we will not find them...most of the time we will get their telephone number from the former staff...and you are supposed to explain your case many times*" CTI005

A substantial staff turnover in site clinicians is also reported by the investigators. Due to this challenge, most are obliged to hire their site clinician for the clinical trial period. The turnover necessitates training in Good Clinical Practice (GCP) multiple times during the clinical trial period.

Financial Resources: Typically, the budget is allocated by the government; however, there are IRERCs without institutional funding, and in some cases, the allocated budget is inadequate. This results in a lack of capacity to run the IRERC smoothly, including the inability to conduct site visit monitoring. There are also cases in which the allocated budget is not utilized. In the case of the EFDA, evaluation fees are collected, which were deemed necessary for contracting external consultants.

Infrastructural: Almost all have reported inadequate working space or archival space. The trial site challenge is also shared by most, particularly the space in health facilities. Occasionally, the distance of the field study site from a general hospital was mentioned as a challenge to handling adverse events. All use private laboratories for most of their tests due to noncompliance and the low interest of governmental institutional laboratories in carrying out GCLP-compliant tests.

Institutional and administrative: Participants described limitations related to an underestimation of the role of ethics committees as well as demands of trial-related tasks by leaders of institutions and higher officials, which leads to poor attention to tasks related to clinical trials. The issue associated with incomplete structural transitions during restructuring was also raised. This resulted in the sharing of resources, the loss of experienced staff and accumulated expertise, and an incomplete transfer of databases, such as identifying suitable reviewers for a particular protocol. The latter resulted in overburdening of chairpersons with consultation for many cases. Inefficiencies of the administrative procedures were cited by almost all respondents. From the insurance industry perspective, the insurance company representative stated that clinical trial has yet to be identified as an industry track, although there is a lot that the industry could benefit from.

> *"I was very much surprised when the doctor said they are buying insurance coverage from foreign countries...when they asked other insurance companies, they have not even heard the name [clinical trial]…. We are losing a big opportunity, and this is embarrassing as a country."* INS001

Researcher factors: Several factors related to researchers were identified as contributing to the delay in protocol approval. These included: incomplete submission, i.e., failure to comply with submission guidelines which relate to experience in submitting protocols; substandard protocol quality; mistimed protocol submission as the review process is highly dependent on regular meetings; the late response of researchers to feedback; and uninformed expectations from the investigator's side i.e., researcher's underestimation of time required for ethics approval. Some researchers are also involved in sponsor-driven trials designed without consideration of the risk-benefit ratio. In multi-country or multi-institutional research, slow approval from partner institutions can also delay approval.

Theme IV: Recommendations for the way forward
Several recommendations addressing factors that delay approval, related to IRERC/regulatory authorities, investigators, and resources, were suggested (Box 2).

Further specific recommendations were made to strengthen the structure of the NRERB by establishing a council or national task force backed by legal frameworks that enhance accountability at a higher level. A revision of NRERB guidelines to address emerging areas of research was also recommended. Regarding the EFDA, specific recommendations included adjusting the regulatory service fee, particularly for nationally initiated studies. An additional suggestion was to establish a senior independent advisory committee or consultants, whose technical expertise can be utilized for certain research areas beyond the capacity of regulatory experts. Recognizing it could be a significant service area with great potential, involving the insurance industry as a stakeholder and enhancing its capacity regarding clinical trials and risk assessments were recommended.

Box 2: Recommendations for improving the clinical trial ecosystem, focused on ethics and regulatory approval processes

- Strengthen ownership: Better sense of ownership by institutional leaders, including providing for a dedicated secretariat; improving physical and IT infrastructure; ensuring adequate institutional budget allocation for review committee functions.
- Establish Registry System: Setting up a web-based national clinical trial registry system.
- Implement Interventions: Conduct gap analysis and implement specific interventions with each stakeholder.
- Build Reviewer Capacity, Particularly in Emergent Areas of Clinical Research and Ethics.
- Incentivize Reviewers: Time compensations, considering review as teaching load, certification, training
- Harmonize approvals: Harmonize ethics and regulatory approvals to eliminate redundant approval processes—Capacitate IRERC to complete ethical approvals, with NRERB assuming an oversight role. As an independent entity, the Advisory Committee on Clinical Trials (ACT) can facilitate such harmonization.
- Conduct Self-Audits: Practice of regular internal self-auditing
- Enhance Communication: Improve communication and information exchange among various stakeholders. Advocacy and awareness creation among institutional leaders and the government. Platforms, such as the ACT, and regular celebrations of International Clinical Trials Day, as well as AHRI's Clinical Trials Net-

Discussion

The ground for conducting clinical trials in Ethiopia appears to be fertile, as indicated by the enthusiasm and aspirations of investigators and representatives from the IRERC and regulatory authorities. The major stakeholders of clinical trials have also identified many strengths and opportunities in the clinical trial system. Strong IRERCs with international recognition is encouraging. Dependable IRERC also eases the burden at higher levels and shortens the overall approval time. Investigators appreciated opportunities for patient recruitment and retention. Although the system was overall considered well-established, it has many challenges and would benefit from improvements. Marked challenges related to human, financial, and infrastructural resources were noted. Institutional factors and those related to researchers were also pronounced.

Challenges related to funding constraints, insufficient incentives, limited capacity-building opportunities, deficiencies in human resources, materials, and infrastructure, along with weak regulatory and administrative systems, have resulted in delayed approvals, complex oversight, and administrative inefficiencies (17, 18). Recommendations made were mainly capacity building, knowledge sharing, experience exchange, networking, collaboration, and prioritizing research systems (17). As the sample of investigators enrolled in our study consisted of investigators, reviewers, and regulators with vast experience in clinical trials, a lack of awareness, confidence, and motivation didn't arise in our study. However, considering the time gap between our study and these two previous studies (17, 18), the similarity of challenges identified signifies unresolved long-standing issues.

There is also a similarity in some of the significant identified barriers and facilitators of clinical trials in Ethiopia such as underdeveloped research infrastructure, workforce capacity, low prioritization, limited funding, and staff turnover, with other study reports (19). Experience of challenges related to recruitment and consent has also been reported. Nonetheless, none of the investigators in our study identified this as a challenge. Availability of patient pool and ease of recruitment were, in fact, identified as an opportunity for conducting clinical trials in Ethiopia, similar to other studies conducted in other developing countries (20). There is also a clear need for building the capacity of investigators. One of the challenges identified in the quantitative research (21), is the low intensity of engagement of clinical trial investigators. Having highly qualified investigators, who are intensely engaged in clinical trials, may have a transformative impact on the national clinical trial landscape.

Due to these many challenges, the progress of clinical trials in Ethiopia has been slow. In a study conducted in 2016, the number of registered studies from Ethiopia was 145 (22).

The number has increased since, though the growth is well below the potential of the opportunities available for Ethiopia. Despite some African countries showing higher participation in clinical trials, the challenges faced by trialists across Africa are shared and reflected in the findings of this study (23-26). However, continental initiatives such as Africa's commitment to local manufacturing of essential health products (27), regional harmonization (24, 28, 29), and efforts to enhance regulatory systems (30, 31) should improve the clinical trials ecosystem. Moreover, the potential benefits offered by clinical trials for improving the standard of clinical care, attracting investment, and contributing to economic growth should not be overlooked by government officials.

Several limitations must be considered when reading this report. First, the number of participants, given the diversity of stakeholders, is limited. For instance, pharmaceutical companies or stakeholders from the private health sector were not involved. This may have restricted the range of opinions and recommendations. The team coordinating the study is working diligently to improve the clinical trial ecosystem. This goal may also have introduced biases. The differing motivations of respondents, such as ethics board members, researchers, and regulators, were not explored adequately.

Conclusion

Clinical trials, corresponding to the complexity and the strength of evidence they provide, rely on interconnected processes, systems, and stakeholders. This study has explored the ecosystem of clinical trials, examining the overall system's strengths, opportunities, challenges, and recommendations for the way forward, based on the experiences of key clinical trial stakeholders. The insights can be beneficial for building on existing strengths and opportunities. One of the critical issues that needs to be tackled as a priority is the lack of overall leadership in the field. While some institutions have attempted to fill the gap, this has not been a mandated responsibility. For instance, as a multi-institutional entity focused on enhancing the clinical trials ecosystem, restructuring the ACT to have a delegated responsibility to coordinate the national clinical trials system will make a significant contribution to national clinical trial leadership. Building broad clinical trials capacity, speeding up the ethics and regulatory approval processes, engaging the pharmaceutical industry and Contract Research Organizations, leveraging digital technologies, and encouraging regionalization are critical ingredients for expanding clinical trial opportunities. In the context of the huge unmet health need, the rapidly growing population, and the drive for local biomanufacturing, Ethiopia can be one of the major clinical trial destinations in the world if a

holistic national engagement is assured.

Abbreviations
AAU: Addis Ababa University; AHRI: Armauer Hansen Research Institute; CHS: College of Health Sciences; EFDA: Ethiopian Food and Drug Authority; EPHI: Ethiopian Public Health Institute; GCP: Good Clinical Practice; IP: Investigational Product; IRERC: Institutional Research Ethics Review Committees; NRERB: National Research Ethics Review Board; TASH: Tikur Anbessa Specialized Hospital

Declarations
Ethics approval and consent to participate: The study was approved by the Institutional Review Board of the College of Health Sciences, Addis Ababa University (Ref No. 067/16/Psy). Prior written informed consent was obtained from the participants. Only codes were used to secure the anonymity of participants and ensure confidentiality.

Consent for publication: Not applicable

Availability of data and material: Data will be made up on a reasonable request to the corresponding author, AF.

Competing interests: The authors declare that they have no competing interests.
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Author's contribution: AF, EM, AH, YW, SMA, TT, AA, AA, and HG conceptualized the study. MM, MS, and MM contributed to the data collection and analysis. MM wrote the first draft of the manuscript under close supervision of AF. All authors reviewed the manuscript and approved the final version.

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Original Article

Ethiopia's Clinical Trial Landscape: Analysis of International Registry Platforms

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Abstract

Introduction: *The number of clinical trials conducted globally is increasing over the past decade. However, engagement of low- and middle-income countries (LMICs) in clinical trials remains disproportionately low. This study aims to assess trends in clinical trials registered from Ethiopia in international trial registry platforms.*

Methods: *A systematic search was conducted across three major international clinical trial registries, i.e., International Clinical Trials Registry Platform (ICTRP), ClinicalTrials.gov, and the Pan-African Clinical Trials Registry (PACTR), to identify registered trials from Ethiopia. The search results were exported in XML format and analysed using STATA version 14.2.*

Results: *A total of 489 studies conducted in Ethiopia were identified across the three trial registry platforms. Over 80% of these trials were registered on ClinicalTrials.gov and the Pan-African Clinical Trials Registry. The predominant focus of the trials was on Infectious diseases, particularly NTDs, TB, HIV and malaria, which accounted for 54.4% of the total. Trials comprising behavioural interventions constituted about 40% of the total. Most of the registered clinical trials were sponsored by local academic institutions, and early-phase clinical trials constituted 9.8% of the total registered studies. The first clinical trial was registered in 1999. However, 85.0% of the trials were registered just in the past decade, since 2015, a year marking the celebration of the first International Clinical Trials Day.*

Conclusion: *Ethiopia has made significant strides in conducting clinical trials, especially in the past decade, reflecting a growing commitment to contributing to global clinical research. However, considerable work is still needed to enhance the role of clinical trials in therapeutic advancement. To sustain and accelerate the current momentum of clinical trials, ethics committees and regulatory authorities as well as academic and research institutes have to increase their effort in partnership with relevant national and international stakeholders, particularly the industry.*

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Introduction

Conducting clinical trials in developing nations, such as Ethiopia, presents a myriad of challenges (1). These obstacles can be categorized into systemic factors, including inadequacy of institutional infrastructure; organizational set up, such as insufficient funding; and individual level factors, notably deficit of experience (2-4).

Despite the high level of disease burden, diverse demographics, and competitive operational costs (5, 6), the number of clinical trials conducted in Africa remains disproportionately low (7). While there has been a global increase in the number of clinical trials over recent years, Africa's participation remains limited. The continent, which is home to over 18% of the world's population, hosts less than 3% of global clinical trials. Projections indicate that Africa's population may reach nearly 2.5 billion by 2050, accounting for over 25% of the global populace (6, 8). This demographic shift highlights the urgent necessity for enhanced investment in clinical trials within Africa to ensure that healthcare services are adequately tailored to meet the specific needs of its expanding and diverse population.

According to Global Data, between December 9, 2012, and March 8, 2023, only 2.2% of global clinical trials were conducted in Africa. During this timeframe, a total of 5,071 clinical trials were conducted, with Egypt accounting for the majority at 2,910 trials (9, 10).

Ethiopia is the second most populous country in Africa with huge potential to advance its health systems and health product development through clinical trials. In this study, we aimed to understand this potential by systematically analysing the evolution and volume of clinical trials conducted in Ethiopia, as evidenced by clinical trial registries. Unlike previous investigations that examined the status of clinical trials within registry platforms, this study specifically focuses on interventional clinical trials (11, 12).

Methods

Search strategy

The search was conducted in December 2024, with search completed on December 18th, 2024. The search focused on three international clinical trials registry platforms although other national registry platforms were also included.

1) The ClinicalTrials.gov: the American clinical trials registry system registers studies conducted in all 50 US states and over 200 countries. This platform is one of the oldest and most well-known clinical trial registry platforms and lists studies involving human participants, addressing health-related research questions, and adhering to ethics review and other health authority regulations and laws (clinicaltrials.gov) (7).
2) The International Clinical Trials Registry Platform (ICTRP): records clinical trial data from multiple registries through an accessible search portal. This platform is the largest clinical trials registry database aggregating data from more than 16 recognized clinical trial registries (13).

3) The Pan African Clinical Trials Registry (PACTR) Portal: includes studies being conducted across Africa (14).

All the databases were searched within the same day December 18th, 2024. The search term "Ethiopia" was entered into the advanced search toolbar, and the search extended from the date when the registry became operational ending on the final search date of December 18th, 2024. The resulting data were exported to XML format. After exporting the data, we verified the presence of all data items required for a clinical trial registration. All data were then exported into STATA version 14.2 for analysis.

Data Abstraction

Data abstraction followed three steps. First, registered studies were grouped into observational and interventional studies. Secondly, all observational studies were dropped as the aim of our study was to describe clinical trials conducted in Ethiopia. Finally, interventional studies were further scrutinized to investigate if the studies were clinical trials. Only studies that fulfilled our screening criteria were included into our synthesis. We extracted data on registration period (whether registered prospectively or retrospectively), conditions or diseases addressed, the type of intervention tested, study designs, purpose of the trial, primary sponsor, institutions responsible for leading the trials and phase of the trial.

Coding of disease conditions studied

Conditions extended from childhood states to infectious diseases and system problems. Studies focusing on conditions related to children including neonates and adolescents that did not involve nutritional disorders were categorized as "Child and Adolescent" conditions. Clinical trials focussing on maternal and reproductive health, excluding aspects related to nutrition, were classified as "Maternal and Reproductive Health". Studies focusing on Neglected Tropical Diseases (NTDs) and Non-Communicable Diseases (NCDs) were coded as NTD and NCD, respectively. Other studies investigating specific diseases such as cancer, malaria, tuberculosis (TB) and HIV were categorized according to their respective disease designations. Infectious diseases not covered by these categories were classified under "Other Infectious Diseases." Additionally, studies that focused on nutritional conditions or problems were coded as "Nutritional Disorders." Disorders that did not fit into any of the specified categories were classified as "Others."

Coding the type of intervention

Interventions involving drugs, vaccines, diagnostics, and devices were coded as "Drug," "Vaccine," "Diagnostic," and "Device interventions," respectively. Studies that provided nutritional supplements were classified as "Dietary Supplement," while those focusing on health systems were coded as "Service."

Studies that focused on surgical procedures were categorized as "Surgical Procedures." Additionally, education, psychosocial interventions, exercise and interventions related to behavioural change were coded as "Behavioural and Educational interventions." Studies that involved complex interventions were coded as "complex interventions". Interventions that did not fit into any of the specified categories were classified as "Others."

Coding of institutes leading the trial

The study registries were reviewed and institutions that were primarily involved in the study were coded accordingly. If the primary institute was not clearly identified, then affiliation of the study contacts was reviewed, and their institute was considered the leading institute. If no institute was found, then the primary sponsor of the study was considered the leading institute of the study.

Coding of Sponsor type

Studies sponsored by Ethiopian higher education institutions were coded as "local academic institution" and those sponsored by academic institutes located outside Ethiopia were coded as "global academic institutes". Those sponsored by research institutes were coded as "research institutes". Industry sponsored trials were coded as "industry sponsored". Studies sponsored by non-governmental organizations (NGOs) were coded as "NGO". Those sponsored by the principal investigators, consultant offices and ministerial offices were coded as "other".

Coding countries of study participant recruitment

The countries of recruitment were categorized as "Ethiopia" if conducted only in Ethiopia or "Multi-countries" if the trial included other countries.

Multiple registry

In cases where studies were registered across multiple registry sites, the registry platform that recorded the study first was used for analysis, while the subsequent registries were excluded from consideration.

Data were summarised through simple descriptive analysis, including descriptive graphs.

Results

Registry and selection

As of December 2024, a total of 1,001,794 studies are registered worldwide in the ICTRP. The search results for Ethiopia yielded a total of 1,102 studies: 259 from PACTR, 297 from ClinicalTrials.gov, and 646 from ICTRP. Of the studies identified, 560 duplicates were removed, and an additional 153 studies were excluded as they were registered in multiple sites or did not contain Ethiopia as a site or were not interventional but rather observational studies. (Figure 1).

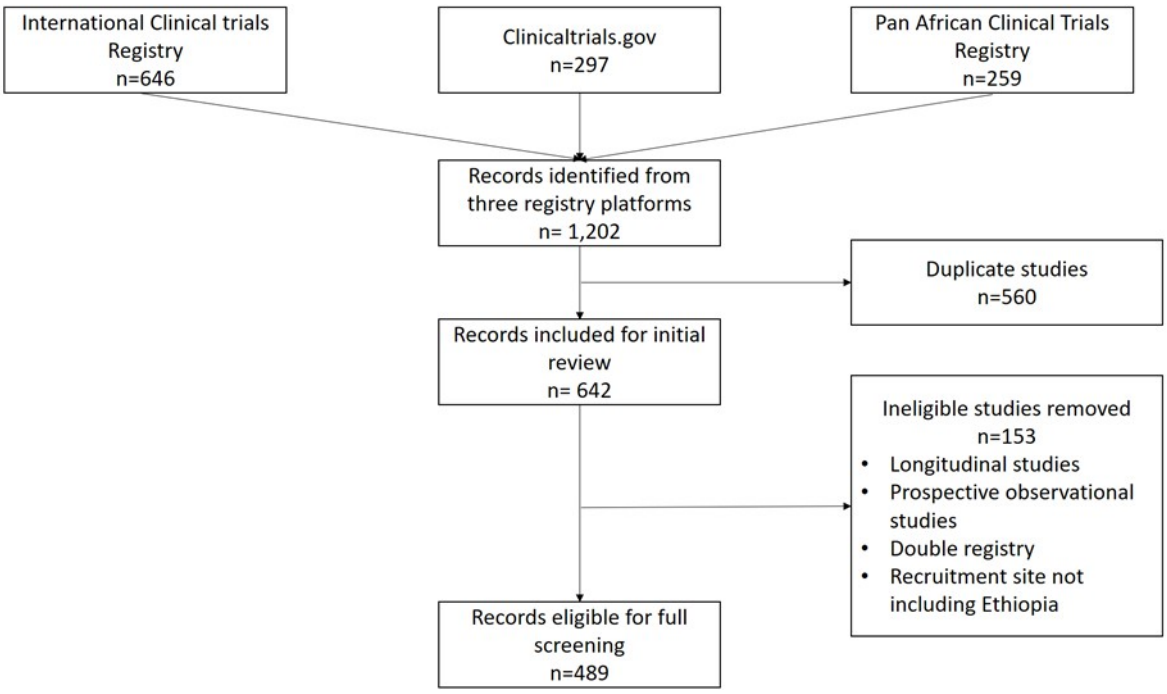

Figure 1 : Study selection flow diagram, Dec 2024

In addition to the three main registry platforms, eight additional registries were identified. However, all these studies were mostly registered on Clinicaltrials.gov and PACTR (Table 1).

Table 1: Clinical trials registering platforms, Dec 2024

S. No	Registering platform	Number of Trials Registered
1	Clinicaltrials.gov (USA)	230
2	Pan African Clinical Trial Registry (PACTR) South Africa	201
3	ICTRP	68
	Specific Registry platforms on ICTRP	
1	United Kingdom's Clinical Trials registry platform ISRCTN	34
2	Australian New Zealand Clinical Trials Registry (ANZCTR), Australia	9
3	Clinical Trials Registry – India (CTRI), India	7
4	Others	8

Others: Chinese Clinical Trial Registry (ChiCTR), China, EU Clinical Trials Register of European Union Countries, German Clinical Trials Register, Germany, Iranian Registry of Clinical Trials (IRCT), Iran, Brazilian Clinical Trials Registry (REBEC), Brazil, Thai Clinical Trials Registry (TCTR), Thailand

The first clinical trial conducted in Ethiopia was registered in 1999 (5), and since that time, the number of registered clinical trials has steadily increased (Figure 2). Between 2009 and 2014, the number of registered clinical trials remained stable, exhibiting consistent growth.

There was a notable rise in the number of clinical trials in 2014, of which 85% were registered since 2015. There was further surge, albeit modest, following the COVID-19 pandemic although this falls to pre-2020 level in 2024.

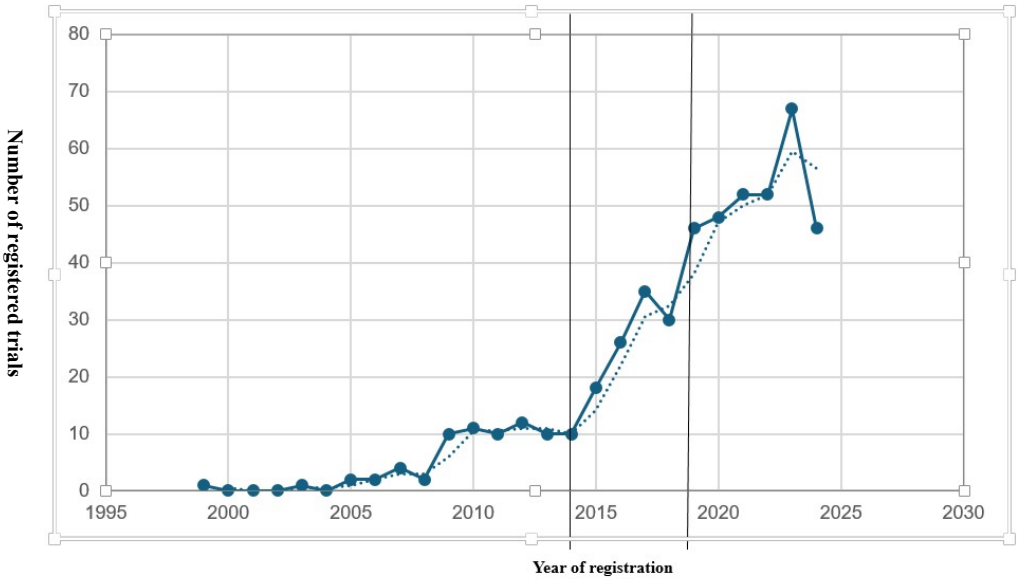

Figure 2: Number of clinical trials registered in the three registry databases by year of registration (with trend line), Dec 2024.

Origin and type of registered studies
Over three quarters of the studies (n=399, 81.6%) were carried out exclusively in Ethiopia, while the remaining 90 studies (18.4%) involved other African countries or other regions as well.

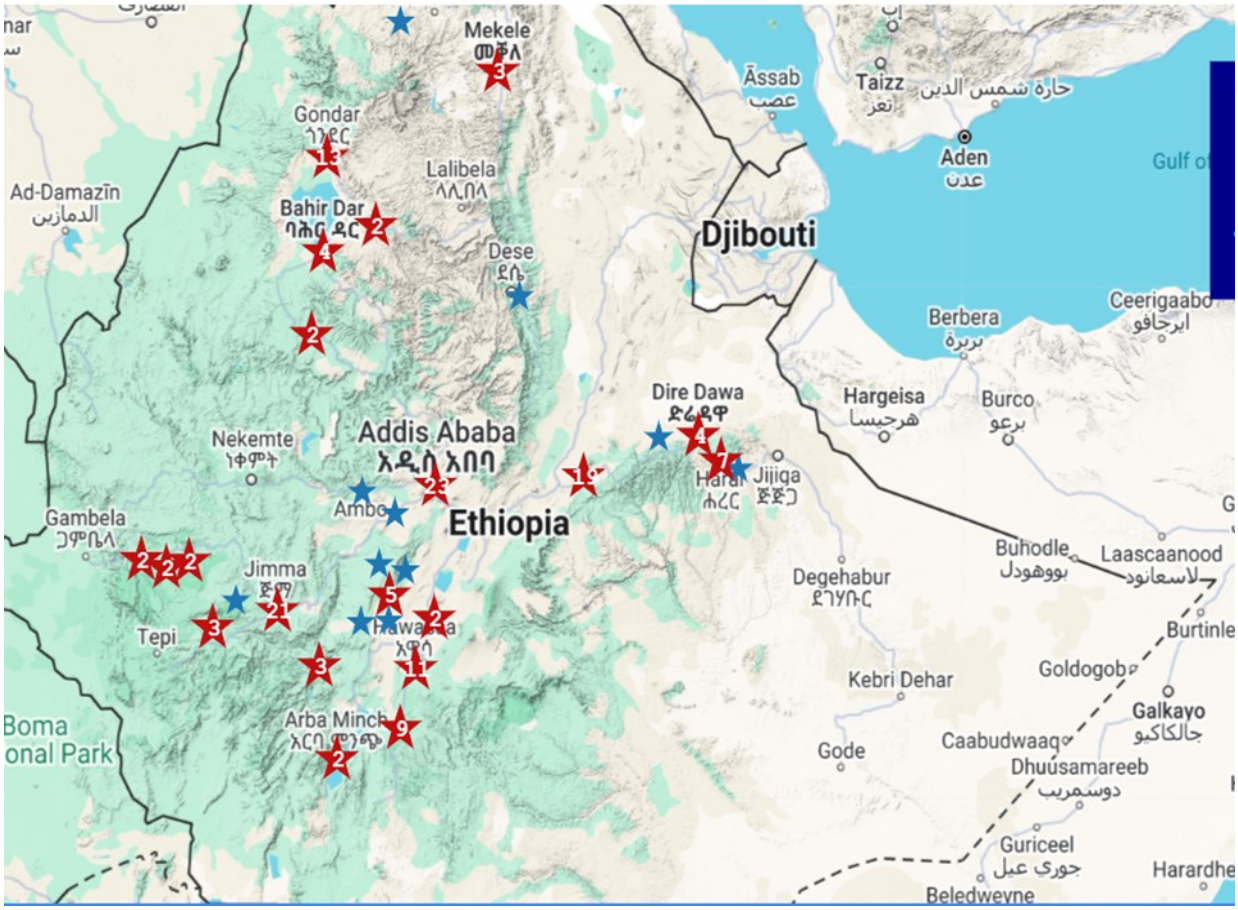

Figure 3: trial sites in Ethiopia (Source Pan African Clinica trials Registry platform https://pactr.samrc.ac.za/Search.aspx).

: Single recruitment centre,

Multiple recruitment centre

Within Ethiopia, there were over 500 recruitment sites across the country (Figure 3), with Addis Ababa University, Jimma University, the University of Gondar, Hawassa University, the Armauer Hansen Research Institute (AHRI) and the Ethiopian Public Health Institute, being the leading institutions conducting and/or sponsoring the trials.

More than 57% of the trials were registered retrospectively, and over a quarter of the trials (27.4%) included more than 1,000 participants (Table 2). The clinical trials employed a diverse range of designs, with the majority employing parallel randomized trials (n=338, 69.13%), while stepped wedge design representing under 1% of the trials (n=2).

Table 2: Characteristics of studies by registration period, study design and sample size, Dec 2024

	Number	Percent
Registration period		
Prospectively registered	207	42.3
Retrospectively registered	282	57.7
Sample size		
0-100	89	18.2
101-200	64	13.1
201-500	119	24.3
501- 1000	83	17.0
More than 1000	134	27.4
Study Design		
Parallel, randomized	338	69.1
Parallel, non-randomized	34	7.0
Factorial	53	10.8
Single Group Assignment	32	6.5
Cross-over	18	3.7
Sequential Assignment	12	2.5
Stepped wedge	2	0.4

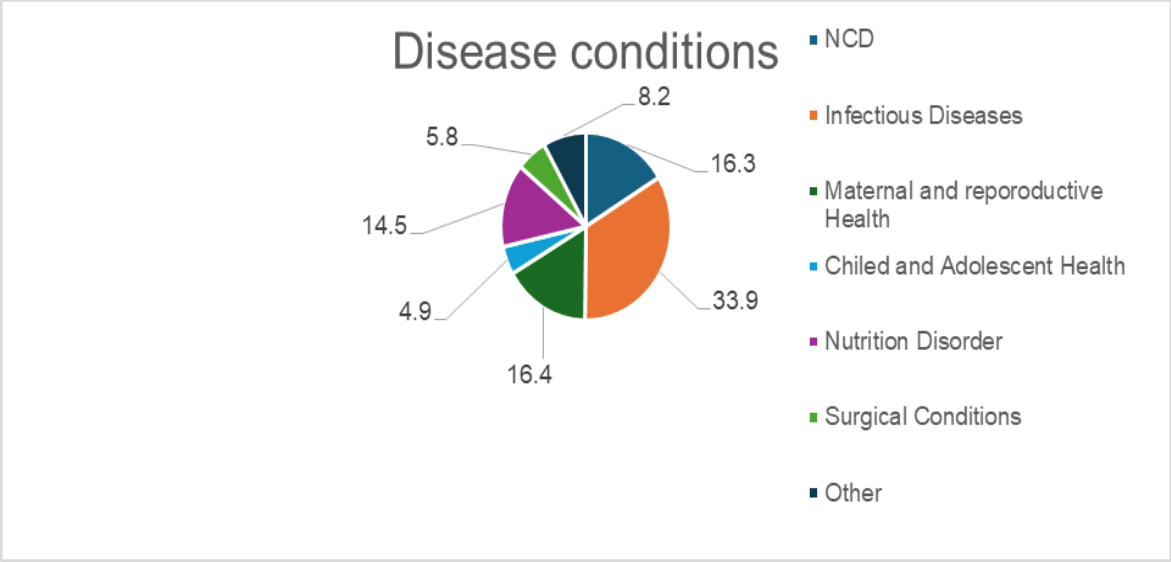

Figure 4: Summary of conditions addressed in the clinical trials, Dec 2024.

Disease Conditions

Most of the trials focussed on Infectious conditions, particularly NTDs, HIV and malaria. However, non-infectious diseases, including diabetes mellitus, and hypertension are also receiving more attention (Figure 4 and Figure 5).

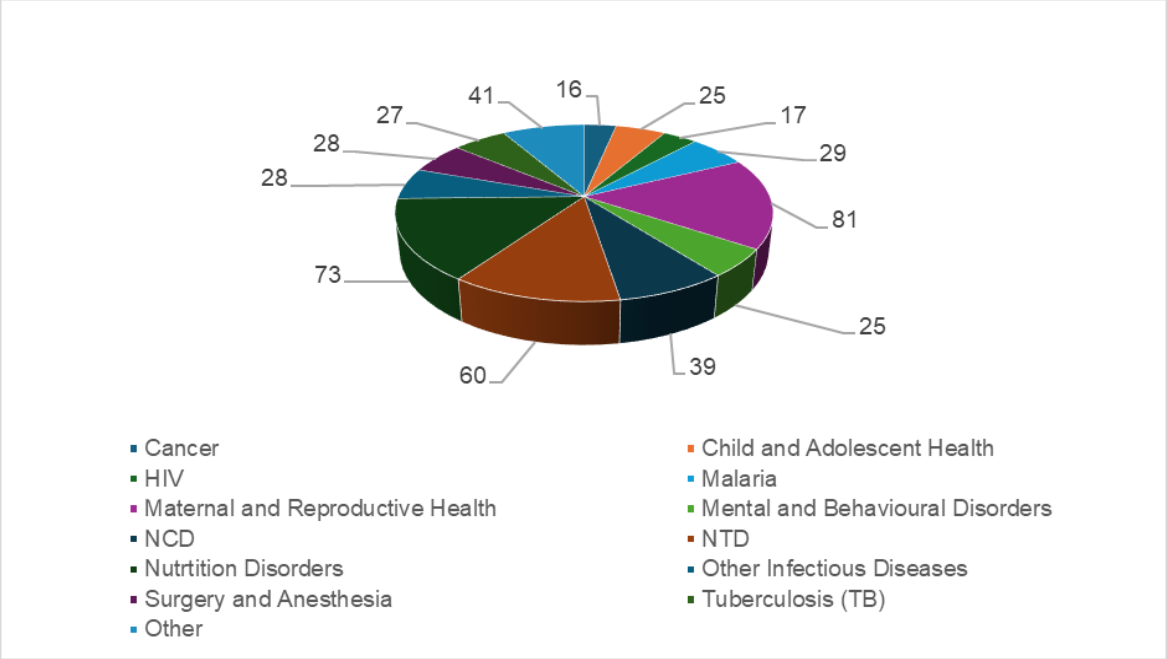

Figure 5: Extended list of disease conditions. Other=Old people, Anaemia, healthy people, No disease condition, Dec 2024

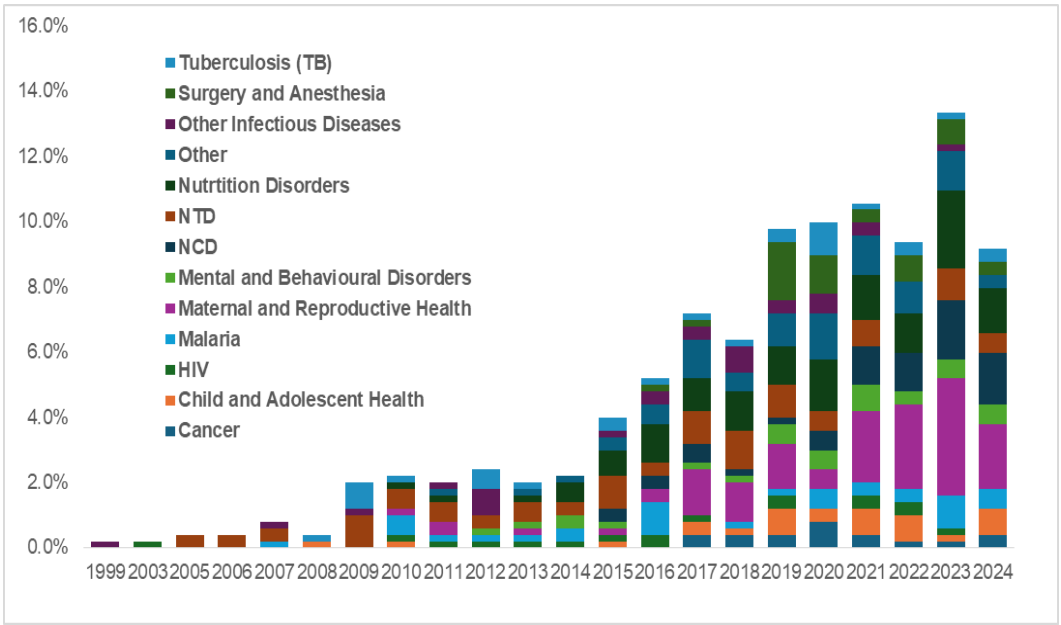

Figure 6 : Conditions registered by year of registration, Dec 2024

Clinical trials focusing on conditions such as cancer emerged in 2017, and since then, their numbers have shown a consistent increase until 2024, when there was a general decline in the registration of clinical trials. In contrast, clinical trials related to NCDs have been steadily increasing since 2019 (Figure 6).

Intervention type

Behavioral and educational interventions were the most prevalent types of interventions, followed by drug trials (Figure 7). A substantial proportion of clinical trials were designed with two primary objectives: prevention (35%) and treatment (33%). The number of vaccine trials, and diagnostic trials represented a small fraction of the total number of clinical trials: about a quarter of the trials (26.1%, n=120) were related to drugs, with 0.6% (n=3) for vaccines and 2.6% (n=13) for diagnostics. Behavioral and educational interventions focussed on nutrition-related research addressing nutritional health outcomes.

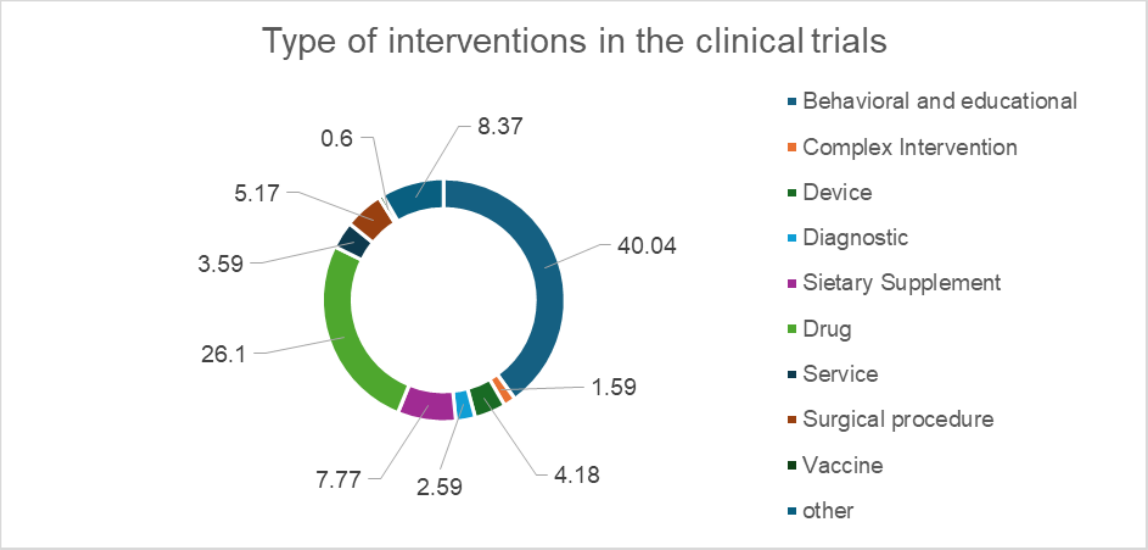

Figure 7: Type of interventions in the clinical trials presented as percentages, Dec 2024.

Other: community based TPT initiation, program evaluation, community-based demonstration, Application of mother milk on umbilical cord, Solar Water Disinfection, changing stove, wash infrastructure and education, weekly questionnaire administration

Although the majority of the trials were Phase III, 9.8% of the trials fall within the early phases (Phase 0-II). These early-phase studies included bioequivalence, safety trials, and novel entity trials among patients with cancer.

Sponsor type

Local academic institutes were the primary bodies for conducting clinical trials, accounting for more than 68% of the registered trials (Figure 3). Clinical trials sponsored by pharmaceutical companies remain limited in number. Most of the studies were sponsored by local academic institutions such as Addis Ababa University, Jimma University, the University of Gondar, Arba Mich university, Hawassa University and research institutions such as the Armauer Hansen Research Institute (AHRI) and the Ethiopian Public Health Institute.

Discussion

A total of 503 trials were identified across various registry platforms, employing diverse designs. Over 9% of these studies were early-phase investigations, with an increasing trend observed over the years. The studies were conducted at numerous recruiting centres. Trials in infectious diseases were predominant, followed by maternal and reproductive health; however, a shift overtime towards NCDs is being noted.

Most trials were registered in the PACTR and ClinicalTrials.gov, accounting for over 87% of registered trials. According to the ICTRP, Ethiopia is ranked 78th in the world and 9th in Africa in the number of clinical trials conducted, following Egypt, South Africa, Kenya, Nigeria, Tunisia, the United Republic of Tanzania, Uganda and Ghana (13).

Prior to 2014, Ethiopia had registered a total of 145 clinical trials (11). A remarkable shift occurred in 2015, with steep increase in the number of clinical trials. Although many factors are likely to have operated, it is worth noting that the first International Clinical Trials Day (ICTD) was celebrated in May 2014 (1). Despite this encouraging trend in the number of trials being conducted, Ethiopia's overall contribution to the African clinical trials landscape has shown only a marginal increase. Specifically, the country's share rose from 1.5% (1) to 1.68%, reflecting a mere 0.18% growth. This statistic suggests that while local research activities are indeed on the rise, they may not be keeping pace with the broader expansion of clinical research across the African continent. Given that Ethiopia is the second most populous country in Africa, the per capita distribution of clinical trials remains quite low. This situation highlights a pressing need for strategic interventions aimed at bolstering Ethiopia's contribution to the global clinical trial.

Ethiopia, with rich heritage of traditional medicine resources and knowledge and recognized as one of the African countries to adopt modern medical practices early (15), has paradoxically made only modest strides in the field of clinical trials over the years. With a population exceeding 130 million and making 1.7 % of the world's population (16), contributes less than 0.1% of the global clinical trials. This underwhelming figure may be attributed to a multitude of factors that impede the advancement of clinical trial within the country such as poor linkage between institutes, limited research capacity and underdeveloped research infrastructure (1, 12).

Early-phase clinical trials in Ethiopia are considerably fewer in number compared to those conducted in other African countries, such as Egypt, Kenya, Nigeria, and South Africa (12, 17, 18). Building the necessary expertise to design and conduct early phase trials effectively and strengthening infrastructure needed to conduct Phase I clinical trials is important to increase opportunities for early phase studies and health product development.

Additionally, the current landscape of clinical trials in Ethiopia reveals a notable disparity in the number of bioequivalence studies compared to other types of clinical research. However, this trend is anticipated to shift soon due to recent regulatory developments in which the Ethiopian Food and Drug Authority (19) has started pushing pharmaceutical companies to conduct bioequivalence studies prior to market entry of their products.

It is also noteworthy that more than two-thirds of the clinical trials conducted in Ethiopia are sponsored by local academic institutes. This statistic highlights a high reliance on domestic resources for clinical research and underscores the urgent need for capacity development within the country. While local institutes play a critical role in advancing clinical trials, there is an urgent necessity for increased engagement of industry and product development partners to enable genuine therapeutic advancement in the country.

In line with the evidence from this registry study, previous studies have highlighted the shift in the focus of clinical trials in Ethiopia towards NCDs (11). The surge in research related to NCDs can be largely attributed to the rising prevalence of these diseases within the country, which mirrors broader global health trends (20)

While it is encouraging to note the increase in clinical trials specifically addressing cancer, it is important to recognize that the number of these trials remains significantly lower than the actual burden of cancer in Ethiopia. This discrepancy is unlikely to be merely due to capacity or infrastructure issues, especially considering the higher the volume of cancer-related clinical trials conducted in other African nations (18, 21). Further action, including enhancing partnerships with industry, is required.
The current landscape of clinical trials in Ethiopia also reveals a somewhat worrisome trend: the number of trials focused on drug, diagnostic, and vaccine remains relatively low. Furthermore, the drug trials that do exist predominantly involve non-novel products. Integrating traditional medicine with modern therapeutic approaches may be needed.

Behavioural and nutritional interventions are commonly reported. Whether these were driven by external donor interests or prompted by national priorities is unclear.

While there is compelling evidence suggesting that Ethiopia possesses the capacity and potential for growth in the realm of clinical trials—evidenced by the increasing number of ongoing trials, recruitment sites and a few number of early phase clinical trials—the engagement of pharmaceutical companies and Contract Research Organizations (CROs) remains conspicuously limited in comparison to other African nations such as South Africa and Egypt. In these countries, a significant proportion of clinical trials—approximately 40% in South Africa (19) and between 38% to 43% in Egypt (18) -- are primarily sponsored by industry. Pharmaceutical companies heavily invest in research and development, contributing substantially to the world economy and created numerous jobs (22). Thus, this apparent disparity highlights a critical gap in Ethiopia's clinical trials landscape.

Despite having established a robust ethical and regulatory framework (1), Ethiopia faces challenges in attracting the involvement of pharmaceutical companies and CROs. These organizations play a pivotal role in the global clinical research ecosystem, not only by providing financial resources but also by fostering innovation and facilitating access to cutting -edge therapies (23). The absence of substantial sponsorship from these entities limits the scope and scale of clinical trials in Ethiopia, thereby hindering the country's ability to contribute significantly to global health advancements. To enhance the clinical research landscape in Ethiopia, targeted efforts must be exerted to engage pharmaceutical companies and CROs. This can be achieved through the development of strategic partnerships, and initiatives aimed at showcasing the country's unique potentials and disease profiles that are of interest to global researchers. It is also important to improve the clinical trials ecosystem more broadly.

The strength of our study lies in the comprehensiveness of the information gathered. We meticulously collected and verified data from each study, ensuring that all relevant details were included and accurately represented. This thorough approach not only enhances the reliability of our findings, but also provides a solid foundation for drawing meaningful conclusions.

One limitation of our study was the inability to clearly delineate the study phases due to inconsistencies across the various platforms used for data collection. Each platform has unique format, structure, and comprehensiveness. This lack of standardization made it challenging to synthesize data effectively, as specific details that were available on one platform were often missing or presented differently on another.
Additionally, we encountered difficulties with the PACTR. Navigating this registry proved cumbersome, as the interface was not intuitive, and retrieving relevant information required considerable time and effort (16).

Conclusion
Ethiopia has made commendable progress in enhancing its engagement in clinical trials; however, there remains considerable work to be done to fully realize its potential as a significant contributor to global clinical trials. To build on this progress, it is imperative to address the barriers that hinder engagement of pharmaceutical companies and CROs. Furthermore, the government should provide targeted support and incentives for academic institutes to cultivate innovation and enhance research-related activities, including training programs for researchers and streamlined processes for trial approvals. By fostering a collaborative ecosystem that prioritizes research and development, Ethiopia can improve its clinical trial landscape, but also position itself as a key player in the global clinical trials arena, ultimately benefiting public health both locally and internationally.

Abbreviations
CRO: Contract Research Organizations, ICTD: International Clinical Trials Day, ICTRP: International Clinical Trials Registry Platform, NCD: Non Communicable Disease, NGO: Non-Governmental Organizations, NTD: Neglected Tropical Disease, PACTR: Pan African Clinical Trials Registry,

Declarations
Ethics approval and consent to participate: Not applicable

Consent for publication: Not applicable

Availability of data and material: De-identified participant data will be made up on a reasonable request to the corresponding author, AF.

Competing interests: The authors declare that they have no competing interests.

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Original Article

The Engagement of Physicians in Clinical Trials in Ethiopia

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Abstract

Background: *Physicians have a vital role in the design and conduct of clinical trials. Their involvement promotes evidence-based practice, and improves patient care. However, the degree of their engagement varies across regions and countries. This study aimed to assess the engagement and experience of physicians in the design or conduct of clinical trials in Ethiopia.*

Methods: *A cross-sectional study was conducted in three teaching hospitals where clinical trials are frequently conducted in Ethiopia: Tikur Anbassa Specialized Hospital, University of Gondar Specialized Hospital, and Jimma University Medical Center. The experience of the physicians from the three hospitals was assessed using a self-administered questionnaire. The data were analyzed descriptively.*

Results*: A total of 213 physicians were involved in this study, of whom 40 (19%) reported current or previous engagement in the plan and conduct of clinical trials. Among those who were engaged in clinical trials, 57.5% (23 out of 40) had been involved only in one clinical trial. Of those who were engaged in clinical trials, 80% reported that the clinical trials they were engaged in were registered in clinical trial registry platforms although only half had been an author of any trial-related publications. The physicians noted that obtaining ethics and regulatory approval took too long. While nearly all physicians who participated in the study (98%) expressed an interest in getting involved in future clinical trials, only17% were aware of any ongoing clinical trials within their institutions.*

Conclusion*: The engagement of physicians in clinical trials is low and most appear to have minimal awareness. However, many would like to get more involved. There is fertile ground to engage physicians in clinical trials, though this may necessitate training in clinical trial management and design and greater awareness of clinical research careers.*

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Keywords: *Physician, Clinical trial, Clinical trial involvement, Clinical trial experience, Ethiopia*
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Introduction

Clinical trials play a key role in testing new therapeutics and advancing medical knowledge. They provide the gold standard evidence for policy and clinical decision-making(1, 2). In addition, clinical trials offer opportunities for human and infrastructure capacity building and national economic development(3, 4).

Ethiopia is the 10th most populous country in the world representing about 1.7% of the world's and 9.1% of Africa's population(5). However, only 0.06% of the global (6), and 1.5% of Africa's clinical trials are conducted in Ethiopia(7). Globally, drug development focuses little on diseases that affect the population of Ethiopia or Africa more broadly. For example, only 10 of 1556 new drugs produced from 1975 to 2004 targeted neglected tropical diseases (8). Lack of attention to the clinical challenges affecting Ethiopia leads to limited local evidence to inform policy and practice and lost opportunities to improve quality of care, target diseases that affect the region, and foster employment and economic development opportunities.

Physicians play a crucial role in the design and successful execution of clinical trials, given their involvement in patient care, implementation of trials, safety monitoring, and ethical oversight. Their involvement in clinical trials promotes evidence-based practice, improve patient care and fosters their professional development (9). Without the participation of physicians, the untapped opportunities of clinical trials cannot be fully realized (9, 10). Yet, the number of clinicians engaging in clinical trials is low. A survey conducted by the Association of American Medical Colleges reported that 14% of all physicians and 24% of academically affiliated physicians were involved in research (11). A similarly low number of physicians in Africa are involved in clinical trials (12). In UK, 40% of physicians are involved in clinical research (13) with the majority involved are academically affiliated. Surveys conducted in United States indicated that physicians' engagement in clinical research is declining (11, 14, 15). Several factors such as time constraints, lack of research expertise, lack of confidence, and organizational and operational barriers may limit the engagement of physicians in clinical trials (16). Lack of funding, lack of training and capacity-building opportunities, poor institutional support, and regulatory barriers were reported in developing countries (12). Few clinicians also reported lack of research interest as a reason for not engaging in clinical trials (16).

Despite the relevance of physician engagement in clinical trials, there is limited evidence on the extent of physician engagement in clinical trials in Ethiopia. This cross-sectional survey aimed to assess the engagement and experience of physicians in the design and conduct of clinical trials. The results may inform efforts to strengthen the clinical trial workforce in Ethiopia.

Materials and methods

Study design and setting

This descriptive cross-sectional study was conducted from December 2019 to January 2020, at three university hospitals: Tikur Anbessa Specialized Hospital (TASH), University of Gondar Specialized Hospital, and Jimma University Medical Center. The hospitals were selected based on their engagement in clinical trials, determined by the number of registered clinical trials in two major clinical trials registration databases, such as ClinicalTrials.gov, and the Pan-African Clinical Trials Registry (PACTR).

TASH is the teaching hospital of Addis Ababa University and is the largest public tertiary hospital in Ethiopia, with over 700 beds. The hospital serves approximately 700,000 patients per year and has over 300 medical doctors(17).

The University of Gondar Specialized Hospital is a tertiary healthcare hospital serving about 5 million people in the North-West of Ethiopia, with over 600 beds. The hospital has over 1000 health professionals, including more than 200 physicians (18).

Jimma University Medical Center is a teaching hospital of Jimma University, Ethiopia. The hospital has a bed capacity of 800 and provides services for approximately 16,000 inpatient and 220,000 outpatient attendants annually. The hospital is staffed with over 1000 health professionals, of whom 140 are physicians (19).

Participants and sampling technique

Physicians working in the three university hospitals (TASH, Gondar and Jimma) were selected through a convenience sampling approach. The physicians were recruited in two ways: those who had experience in conducting clinical trials were identified through clinical trial registries and expert recommendations. Those who were not on that list were approached through selected departments. Questionnaires were distributed across institutions without predefined quotas or proportional representation.

Sample size
The sample size was determined using a single population proportion formula. The estimate for the proportion of physicians engaged in clinical trials is not reported from Ethiopia. We, therefore, used the available estimate from the United States: 14.7%(20). With further assumptions of 5% margin of error, 95% confidence limit, and 10% non-response rate, the required sample size was 212 participants. Even though the reference population difference should not be disregarded, we took an overall assumption that

this would be a sufficient sample size for the descriptive objectives of the study. However, due to the higher non-response rate observed during the data collection, we distributed 354 questionnaires (203 in Addis Ababa, 67 in Gondar and 84 in Jimma).

Data collection
A self-administered structured questionnaire was developed for data collection. The questionnaire contained information on demographic and professional profile, engagement in clinical trials, experience obtaining ethics and regulatory approval, trial registration and publication, institutional support to engage in clinical trial, and interest in conducting or continuing to conduct clinical trials.

Data quality assurance
Field supervisors were trained on the contents of the questionnaire before data collection. The supervisors checked the completed questionnaire to ensure completeness and consistency of the filled data.

Data management and analysis
Data were entered into Epi-data version 3.1 and exported to SPSS version 20 for analysis. The data were analyzed descriptively. Percentages, frequency tables, and descriptive figures were used as appropriate. Content analysis was used to summarize the responses of the open-ended questions.

Ethical considerations
Ethical approval was obtained from the institutional review board of the College of Health Sciences, AAU (Ref no. 067/16/Psy) before the start of the survey. The participating institutions were also informed about the study. Informed consent was obtained from the participants after they were informed of the study aims and purpose of the interviews. Only codes were used to secure the anonymity of participants and ensure confidentiality.

Results
Characteristics of participants
A total of 213 participants (112 from TASH, 48 from Gondar, and 53 from Jimma) completed the survey, yielding an overall response rate of 60.2% which varied by setting (55.2% at TASH, 71.6% at Gondar, and 63.1% in Jimma). The overall sample size achieved the calculated minimum sample size required for the study. The demographic and practice characteristics of study participants are summarized in Table 1. Most participants were male (77.4%), and about half of the physicians were specialists (57.3%). More than half of the physicians (58%) had worked as physicians for more than five years.

Table 1: Participants' characteristics at three university hospitals in Ethiopia, 2019/20

Characteristics		Number	Percent
Sex	Male	146	77.4
	Female	48	22.6
Qualification	Specialist	122	57.3
	Sub-specialist	77	36.2
	Others (MSc, PhD)	14	6.5
Year of experience	<5 years	89	42
	5-9 years	55	25.9
	>10 years	68	32.1

Trial engagement
Forty physicians (18.8%) have ever been engaged in clinical trials. Male and female physicians equally participated (19% each). Among those who were engaged in clinical trials, most (80.0%) were engaged only in one or two trials (Fig. 1). Of those who were engaged, about half (52.5%) were engaged in clinical trials at the time of the study (Table 2). Most of the physicians engaged in clinical trials had worked in more than one role: a quarter as Principal investigator (PI) and as trial physician, and about half as co-PIs. Additionally, some participants had roles as co-investigators, monitors, members of the Data Safety Monitoring Board (DSMB), advisors or study managers. One in six physicians is aware of clinical trials being conducted in their institution.

Table 2: Participants' engagement in clinical trials at three university hospitals in Ethiopia, 2019/20

Question		Number	Percent
Awareness about Institutional engagement in Clinical Trials	Aware	36	17
	No awareness	177	83
Engaged in Clinical Trial	Yes	40	18.8
	No	173	81.2
Last time you were involved in a clinical trial	Currently engaged	21	52.5
	One year ago	5	12.5
	Two years ago	4	10
	Three years ago	5	12.5
	Four years ago	0	0
	Before five years	5	12.5
Were the clinical trials registered in clinical trial registration database?	Yes	32	82.1
	No	5	12.8
	Don't Know	2	5.1
Publications from the trials	None	20	50
	One	9	22.5
	More than one	11	27.5

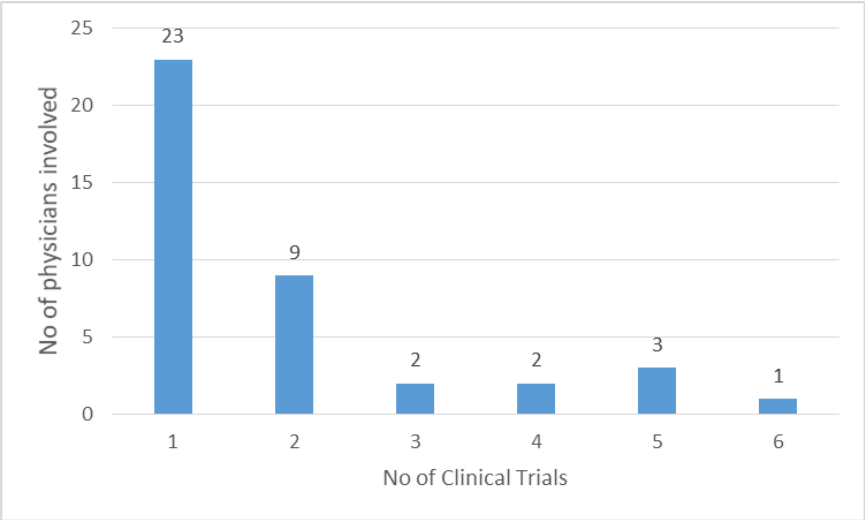

Figure 1. Physicians' engagement in clinical trials at three university hospitals in Ethiopia, 2019/20

Experience in obtaining ethics and regulatory aproval, trial registration, and publication

Physicians who had participated in clinical trials reported that, in addition to the mandatory National Research Ethics Review Board (NRERB) and the Ethiopian Food and Drug Authority (EFDA), one to six additional institutional ethics committees had reviewed and approved the clinical trial protocols. Time to approval from all boards varied from one to 24 months, with an average duration of 12.2 months. The physicians provided different reasons for delay in obtaining

approval. They noted that too many approvals were sought from different unrelated institutions. Respondents noted that delays in the initial review and review of response documents, communication challenges with the ethics committee offices (closed offices or lack of response to phone calls), frequent changes in responsible personnel, and infrequent meetings were barriers. The variable capacity of staff of authorities and institutional ethics committees, the bureaucratic approval process at EFDA and the NRERB, delay in the approval of study drug importation, and delay in customs clearance were additional reasons for the delay. While about 3 in 4 clinical trials were registered in clinical trial registries, only half of the physicians involved had publications from the trials they were involved in.

Institutional support and interest to continue or start being engaged in a clinical trial

Except for one participant, all reported receiving institutional support, including availing the facility, administrative support, mentorship, training, and protected time and funds. Almost all of the physicians (97.7%) expressed interest in beginning or continuing to be engaged in clinical trials. The motivations for their interest were the belief that clinical trials would help generate new knowledge and high quality evidence to improve patient care and treatment outcomes. More broadly, clinical trials were believed to play critical role in healthcare development. The reasons for those who expressed little interest to be engaged in clinical trials were poor readiness of infrastructure, personnel, ethical and legal challenges, and lack of training.

Discussion

This study assessed the engagement and experience of physicians in designing and conducting clinical trials in three teaching university hospitals in Ethiopia. Although most physicians were not engaged in clinical trials and were unaware of ongoing clinical trials in their institutions, encouragingly, those who were engaged reported good institutional support. Almost all expressed interest in getting engaged in future clinical trials. The proportion of female physicians engaged in clinical trials is also encouraging although the overall number of female physicians was relatively small. The findings also suggest that ethics and regulatory approval systems need to be more efficient.

Overall, the proportion of physicians engaged in clinical trials is low, even among a sample that was selected to have higher levels of engagement. Nevertheless, it is comparable to what has been reported in some countries with high clinical trial outputs (11, 15, 20). The major problem was the low intensity of involvement. Among those who were engaged in clinical trials, four in five were involved in just two or fewer trials. With such limited level of involvement, the physicians would not get the opportunity to acquire sufficient expertise. The limited number of clinical trials conducted in Ethiopia might have contributed to this. Lack of training in clinical trials in medical schools, lack of well-defined clinician researcher career pathway and the limited capacity-building opportunities might also contribute to the low engagement.

Virtually all physicians in this study expressed their interest in being engaged in future clinical trials. This finding is consistent with other reports. For example, a survey of 27 African clinical researchers reported that about 93% of the clinicians were interested in being engaged in future clinical studies(12). The motivations mentioned by the respondents, including the importance of clinical trials to generate new knowledge, enhance the quality of care and contribution to personal development were also consistent. Reasons suggested by the respondents for not wanting to be engaged in clinical trials were related to lack of training, experience, ethics and regulatory challenges and poor infrastructure, consistent with reports elsewhere (12, 13, 16, 21, 22). Equally important was the lack of awareness about clinical trials that were being conducted in their institutions. This calls for better awareness creation by their institutions and implementation of dissemination plans of studies set by investigators having active trials

The average reported time to get ethics and regulatory approval for a clinical trial protocol in this study was long. The main reasons given by the respondents for the delays were a lack of skilled staff in the ethics and regulatory bodies, administrative challenges, and the involvement of several ethics boards. A systematic review of studies conducted in developing countries found that delays in approvals as the most common barrier (23). Ethics and regulatory challenges were also mentioned by few physicians in this survey as a factor for low interest to be involved in clinical trials. Therefore, approval processes should be streamlined to attract more clinical trial funding and motivate the engagement of physicians. Some physicians reported shorter approval periods suggesting that the time for approval could be substantially shortened, and lessons may be learned from studies with shorter approval time. The findings showed that although majority of the trials were registered, the publication rate was small. Efforts must be made to ensure clinical trials are registered and results are published.

Given the role of physicians in generating and translating evidences to practice and policy, their engagement in research is crucial(24, 25). Various strategies have been proposed to promote the engagement of physicians in clinical trials. These include integrating training in the medical school curricula, introducing MD-PhD programs, enhancing research funding, offering financial and nonfinancial incentives, offering training, and career mentoring and networking opportunities(9, 24).

Implementation of these strategies has shown promising results in high income countries (9, 26).

The present study has some limitations. The study was carried out in only three university hospitals, which limit the generalizability of the results. Moreover, these university hospitals were selected based on their active engagement in clinical trials and most of the respondents were selected purposively based on their engagement in clinical trial, which might have inflated the proportion participating in clinical trials. The response rate was also much lower than expected, which may introduce non-response bias. To mitigate this, we distributed more questionnaires beyond the initial plan. Factors that affect the participation of physicians on conducting clinical trials were also not explored in this study.

Conclusion

The overall engagement of physicians in clinical trials appears low. However, the primary concern is the low level of engagement. Priority should be given to strategies that attract clinical trials and strengthen physician involvement. The clear barriers described, such as low expertise, low awareness, poor infrastructure, and delayed ethics and regulatory approvals should be tackled through better communication with investigators, strengthening capacity-building programmes, incentivizing clinical trials, and working with industry. Moreover, the mainstreaming of trial approval procedures should be encouraged.

Abbreviations

DSMB: Data Safety Monitoring Board
EFDA: Ethiopian Food and Drug Authority
NRERB: National Research Ethics Review Board
PI: Principal Investigator
TASH: Tikur Anbessa Specialized Hospital

Declarations

Ethics approval and consent to participate:
The study was approved by the Institutional Review Board of the College of Health Sciences, Addis Ababa University. The participating institutions were also informed about the study and assented to the data collection. Prior written informed consent was obtained from the participants. Only codes were used to secure anonymity of participants and ensure confidentiality.

Consent for publication: Not applicable

Availability of data and material: De-identified participant data will be made up on a reasonable request to the corresponding author, AF.

Competing interests: The authors declare that they have no competing interests.

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Author's contribution: AF, EM, AH, YW, TT, SMA, AA, AA, and HG conceptualized the study. MM, MS, HB and MM contributed in the data collection and analysis. RB wrote the first draft of the manuscript under close supervision of AF. All authors reviewed and approved the final version.

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Original Article

Regulatory System Opportunities and Barriers for Conducting Clinical Trials in Ethiopia: A Descriptive Qualitative Study

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Abstract

Background*: Most clinical trials have been conducted in developed countries, and out of the total 343, 835 trials conducted worldwide only 157, i.e., 0.047% have been conducted in Ethiopia as of 26 June 2020. Ethics and regulatory review systems have been stated as the second most common barrier to trial development in Africa. All clinical trials to be conducted in Ethiopia have to get authorization from the Ethiopian Food and Drug Authority (EFDA). However, no study has been done to investigate the effects of clinical trial regulation on clinical trial development in Ethiopia. In this study, we sought to study the enablers and barriers of the regulatory system for the conduct of clinical trials in Ethiopia.*

Method*: A descriptive qualitative study was done from January 01, 2020 – April 25, 2020. Thirteen clinical trial investigators and 2 staff working in the clinical trial team of EFDA were interviewed. The data were analyzed in a thematic way of analysis.*

Results*: the establishment of a team in EFDA with a guideline and committed staff responsible for clinical trials regulation were opportunities; while inadequate staff, financial constraints, space shortage, lack of trial site follow-up inspection, absence of timely feedback to reports, and lengthy approval process were identified as barriers for the development of clinical trials in Ethiopia.*

Conclusion: *In Ethiopia, clinical trial researchers face substantial ups and downs starting from clinical trial authorization to completion. Though the regulatory body is trying to facilitate clinical trial authorization and regulation, the system needs improvement by building and/or strengthening regulatory capacity to encourage investigators to conduct clinical trials in Ethiopia.*

Keywords*: Clinical Trial, Ethiopian Food and Drug Authority, Opportunities, challenges, regulatory system*
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Introduction

A clinical trial is a study conducted with human participants to search for new interventions for the promotion of public health (1,2). Data generated from clinical trials help to add medical knowledge, make healthcare decisions, and revise and/or develop treatment guidelines. They also provide information on treatments' cost-effectiveness, the clinical value of a diagnostic test, and how treatment improves the improvement of quality of life (3).

Clinical trials were largely restricted to industrialized nations with only a limited number of clinical trials conducted in developing countries. The involvement of

developing countries has shown an increase over the past few years (1). The African continent offers conducive environments for implementing clinical trials, such as minimal costs for implementation, diverse populations, varieties of diseases, and populations who may not have been previously exposed to any kind of modern medicines (4). Despite these advantages, the number of clinical trials conducted in African countries is still a small proportion compared to those conducted in other parts of the world. According to the clinicaltrials.gov database, among the 343,835 trials done worldwide up to June 26, 2020, only 10,249 (2.98%) have been conducted in Africa; of which the share of Ethiopia is only 1.53%, compared to Egypt (41.93%) and South Africa (27.24%) (5).

Different factors have been identified as barriers that forced Africa to contribute a few clinical trials to the world. Such barriers included a lack of expertise, budget, infrastructure, and conducive research environment, as well as ethical/regulatory challenges, language/culture barriers, and socio-political conditions (2,6-14,15,16). As there are several stakeholders involved in clinical trials, it is important to understand the role of each stakeholder in the development of clinical trials. Out of these stakeholders, Ethiopian Food and Drug Authority (EFDA) is a governmental institution that is legally mandated to regulate clinical trials which are conducted in Ethiopia. In the Ethiopian Food and Medicine Administration Proclamation No. 1112/2019, the role of EFDA and different legal issues in clinical trials are clearly stated in article 27, sub article 1-11 (17). The main role of EFDA is Authorization of clinical trials and to conduct periodic GCP inspection. While some trial investigators have expressed concerns that the lengthy regulatory approval process may contribute to a decline in interest in conducting clinical trials in Ethiopia, there is a lack of empirical evidence to support this perception. To date, no comprehensive study has been conducted to explore the potential challenges and opportunities within the existing regulatory system that may influence the implementation of clinical trials in the country. Therefore, this study aims to examine the regulatory environment in Ethiopia to identify both facilitators and barriers that may require improvement.

Method

Study Design, Area, and Period

The study employed descriptive qualitative design. Data were gathered from investigators with clinical trial experience across hospitals, universities, and dedicated clinical trial sites in Ethiopia. Previously conducted and ongoing clinical trials in universities, hospitals, and research institutes were identified through the EFDA database, https://ClinicalTrials.gov and http://apps.who.int/trialsearch/default.aspx. The top six trial sites were selected as study areas based on the level of their involvement. The selected study areas were the College of Health Sciences, Addis Ababa University (AAU); All Africa Leprosy Rehabilitation &Training (ALERT) Hospital (Addis Ababa); Jimma University Referral Hospital (Jimma); Gondar University Hospital (Gondar); Hawassa Hospital (Hawassa) and Arba Minch University (Arba Minch). Data were collected from January 01, 2020 – April 25, 2020, by the principal investigator of this study.

Study Participants

Clinical trial investigators and members of the EFDA clinical trial team took part in this study. The study involved EFDA-authorized clinical trial investigators from selected regions who had previously served as a Principal Investigator (PI), Co-Principal Investigator (Co-PI), or coordinator at least once, were present during data collection, and provided informed consent. Those who were involved in behavioral trials were excluded from this study as these did not require trial authorization from EFDA. EFDA staff who were working in the clinical trial unit of EFDA with experience in clinical trial regulations, who were available at the EFDA office during data collection and who gave informed consent to participate in the study were also included in this study. Criterion and snowball sampling methods were used, and 18 individuals were invited to participate in this study. Out of these 15 individuals (13 trial investigators and 2 EFDA clinical trial team staff) met eligibility criteria and participated in the study, while 2 trial investigators and one EFDA staff were not able to take part in the study because they were not available during the data collection period. As there is no general agreement on sample size determination for qualitative studies, the sample size was determined by theoretical saturation for this study.

Data Collection

A semi-structured interview guide was prepared in English and translated into Amharic. The guide was pretested, and all necessary corrections were made. The interviews were conducted at places convenient to participants and interviews were all conducted in person. An in-depth interview was conducted by the main researcher and the first two interviews were in Amharic; however, the remaining interviews were conducted in English realizing that English was the working language for the respondents. The interview took 36 – 92 min and was audio recorded with the permission of the respondents. Ethical approval was obtained from the Scientific and Ethics Review Committee of the Center for Innovative Drug Development and Therapeutic Trials for Africa (CDT Africa), CHS, AAU. Informed consent was obtained from each participant before starting the interview. Both the voice and the transcribed data were kept on a computer locked with a password

Analysis

The recorded interviews were transcribed to a Word file and information was anonymized to assure confidentiality. The Amharic transcriptions were translated to English and a neutral person was consulted to validate the translation. The transcriptions were read repeatedly to become familiar with the data, and a thematic data analysis method was implemented. The thematic analysis was approached in an inductive way of coding. The first 4 transcribed data were imported to open code version 4.03, then coded by the main researcher and another person independently. The two individuals discussed the codes and the code list was prepared. A codebook was developed after 4 transcriptions were coded based on the listed codes, the mutual exclusiveness of each code was checked and minor changes were made to the codes. The remaining data were coded and the newly emerged codes were included in the codebook. The identified codes were grouped into sub-themes, themes, and categories.

Result

Thirteen trial investigators and 2 EFDA staff working in the clinical trial team participated in this study. The respondents were 2 females and 13 males. Most of the investigators have a Ph.D. and clinical trial experience of 16-20 years (Table 1). Amongst these, 13 were PIs, nine co-PIs, one investigator and 4 were in other areas of responsibility (Monitor and DSMB member and chairperson; Coordinator; Supervisor; Collaborator)

Table 1: study participants characteristics

Highest Academic level (n=15)		**Engagement in clinical trials (n=15)**		**Number of trials being involved (n=13)**	
MD	2	1-5 years	3	1-3	5
BSc	2	6-10 years	8	4-6	6
MSc	1	11-15 years	3	7-9	1
PhD	10	16-20 years	1	10-12	1

Clinical Trial Approval Procedure

Trials to be conducted in humans on products including drugs, vaccines, diagnostics, food supplements, herbal products, and other biological products, as well as bioequivalence/bioavailability are required to have ethical review and approval by ethical review committees at various levels before getting authorization by EFDA. After approval is obtained from EFDA the trial can start in compliance with GCP standards (18). Parallel submission to EFDA and the National Health Research Ethics Review Committee (NHRERC) has been introduced during the COVID-19 Pandemic, to facilitate the process.

The findings of this study showed that the clinical trial team from the Product Safety Directorate of the EFDA would be responsible for all issues related to clinical trials. To obtain EFDA authorization an investigator would need to submit the trial protocol together with all related documents both in hard and soft copies, plus ethical approval from respective institutional review boards/ethics committees and ethical approval with the NHRERC approval letter if already obtained. In addition, the receipt of service fee payment had to be sub mitted to the directorate, which is a prerequisite to start the review process. The process is shown in Figure 1.

The EFDA guideline does not indicate a clear timeline for clinical trial authorization (18); though it had been stated in the Citizen charter that the review process would take 6 days to give the first response. However, according to the response given by the staff of EFDA who works at the clinical trial team, it was also noted that the review duration depended on completeness of the submitted document, trial complexity, level of risk to participants, phase of the trial, number of protocols submitted within the same period, presence of other prioritized staff responsibility, number of staff in the team, investigator's timely response the review feedback and communication between the investigator and regulatory staff. The longest time taken to review and provide the first feedback for a low and high risk trials were 1 month and 2- 3 months, respectively. It was also observed that it might take 2-4 months to give trial authorization.

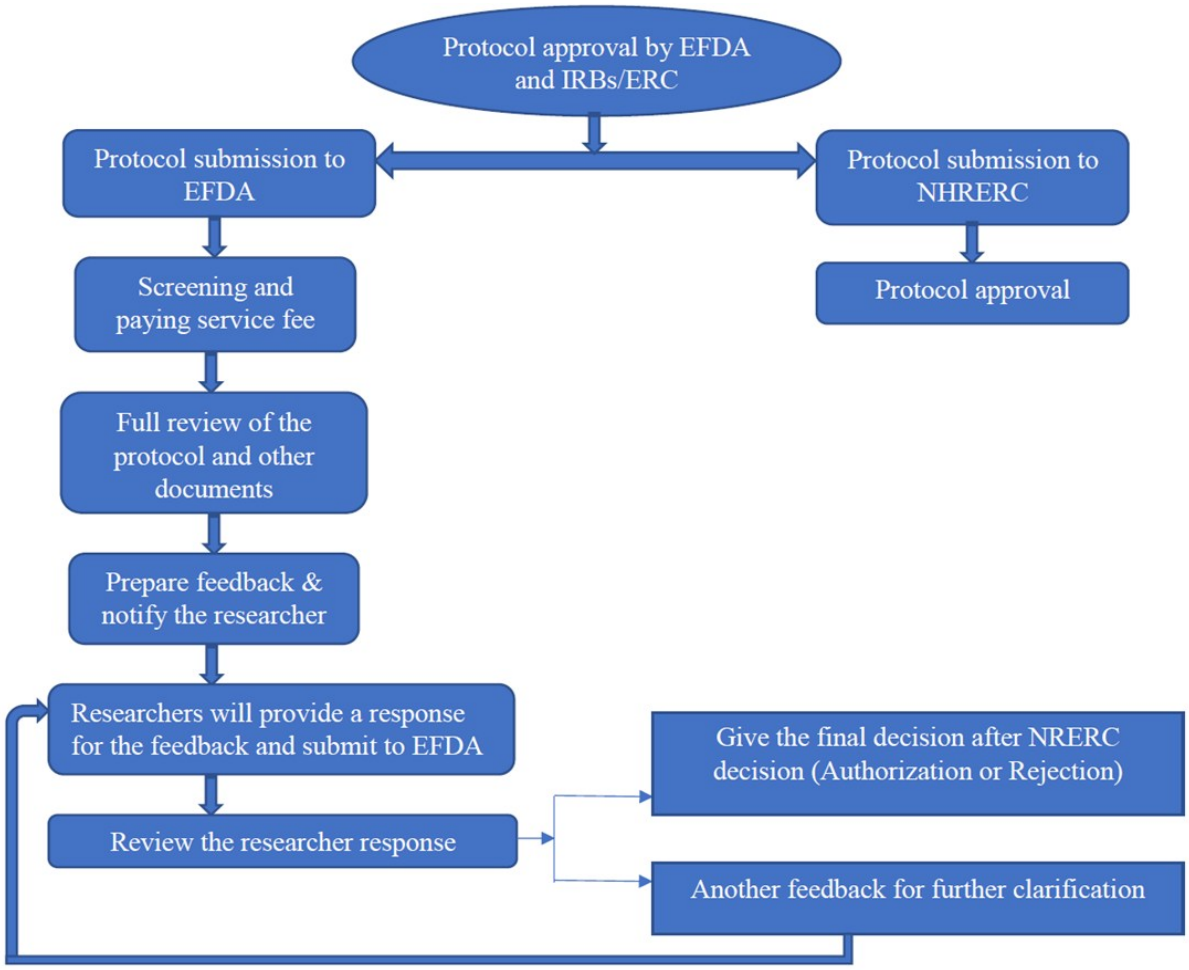

Figure 1. Clinical trial authorization process at EFDA

The EFDA website and workshops organized by the authority and other stakeholders were used to introduce EFDA's roles and responsibilities and to avail various guidelines for the public. The trial team of EFDA had its email in addition to personal work email used for Serious Adverse Effect (SAE) reporting, feedback/information exchanges, and to communicate any trial-related issues.

Mandates of EFDA on clinical trial

The role of EFDA and different legal issues in clinical trials are clearly stated in article 27, sub- articles 1-11 of the Food and Medicine Administration Proclamation No. 1112/2019 (19); (19). The Ethiopian Food and Drug Authority (EFDA) holds key regulatory mandates throughout the lifecycle of clinical trials, including pre-initiation, implementation, and closeout phases. Prior to trial commencement, EFDA is responsible for protocol authorization and site visits. During implementation, it conducts site inspections, reviews periodic and serious adverse event (SAE) reports, provides feedback, and has the authority to suspend, reinitiate, or terminate trials, as well as issue permits for the import and export of trial materials. At the closeout stage, EFDA performs final site inspections, reviews closeout reports, provides feedback, authorizes the use or publication of trial results, and oversees the disposal of leftover materials.

The findings of this study show that commitment of EFDA's staff and management on the regulation of clinical trials was considered to be an opportunity. The staff's motivation to learn, improve their capacity, do routine activity, provide service, participate in joint meeting with research institutions and communicate during trial inspection were also some of the opportunities mentioned. The commit-

ment of the management to address staff capacity building by giving chance for graduate studies and short-term training; having country-specific trial authorization and inspection guidelines; making trial authorization and GCP guidelines accessible online; permitting parallel submission of trial applications to NHRERC were also mentioned as opportunities by investigators.

The EFDA staff highlighted the authority's initiative to address payment-related issues and restructure the clinical trial team as a key opportunity. Additionally, staff participation in national and international conferences and workshops, along with access to a dedicated office and reliable internet, were recognized as valuable factors contributing to improved trial regulation. Three of the investigators, however, did not agree with the aforementioned opportunities, as one respondent stated

"No, no opportunity at all" RSOB GU001.

Strength of the regulatory system

The strengths of the regulatory system stated by the respondents were the presence of EFDA to regulate clinical trials; safeguarding trial participants from unethical practice; doing in-depth protocol review; and online application for trial material importation as one respondent said

> *"… so the good thing is just we have the structure, the institutions, the mechanisms … that is the strength by itself." RSOB JU003*

Two investigators mentioned that EFDA being the only stakeholder responsible for GCP inspection could be considered a strength of the regulatory system, while another investigator expressed confidence in the system, and said

> *"I always have confidence in what EFDA does if the EFDA approves a clinical trial, that clinical trial would have had appropriate scrutiny. The drugs would have had appropriate evaluation or assessment."*

Another perceived strength of the regulatory system both by researchers and EFDA staff was the existence of nationally recognized and legally binding proclamation for trial regulation and GCP guidelines which could help guide researchers on how to conduct a trial in the country.

The presence of a clinical trial team within EFDA responsible for trial regulation, the staff's upfront communication during the site inspection, and the progress made through time were also mentioned as another strength.

One respondent believed that providing trial authorization within a short period is a strength of the regulatory system by saying

> *"Maybe I am lucky …., the time we spent for approval was far from what I expected and I see this strength."*

Three investigators were unable to identify any strengths or positive aspects of EFDA's clinical trial regulation system. And one respondent expressed this by saying

> *"It was mostly difficult and it's hard to think of some good things…… there weren't any good things" RSOBC003.*

Challenges of the Regulatory System

Under this theme, respondents highlighted challenges related to both resources and the system. Poor staff profile of the clinical trial team, limited financial resources, weak infrastructure, and unsuitable working documents were some of the identified resource-related challenges at the time of data collection (January 01, 2020 – April 25, 2020).

Challenges related to human resource

Although some researchers lacked precise data on the clinical trial unit's staffing, they noted from experience that an insufficient number of staff to support trial-related services and the lack of delegation in their absence posed significant barriers to clinical trial implementation by stating that

> *"I think the challenge is they don't have enough staffing so if that person is on meeting your issue will be suspended…" RSOBC001. The lack of adequate number of staff was also mentioned as a challenge by EFDA staffs.*

In association with staff's capacity: At the time of data collection (January 01, 2020 – April 25, 2020); limited training on clinical trials, lack of capacity and experience to review protocols and to regulate clinical trials were mentioned as a challenge by most of the researchers. In addition to this, some of the researchers mentioned that: most staff have first degrees only, not being able to understand researchers, and do not have practical experience in trial implementation a challenging factor in conducting clinical trials in Ethiopia. As one of the respondents mentioned there was also a language barrier and a lack of capacity to write review feedback and site

visit reports as well as a lack of understanding and experience in some types of clinical trials which hindered trial development. The concern about the lack of training in trial-related issues was also shared by EFDA staff.

Limited professional mix within the trial regulation team such as not having physicians, not having a committee to do protocol review, having double responsibility, and being busy with other activities like going to the field with multiple activities, attending meetings, and not being in the office to do the review and to meet investigators were mentioned as barriers by clinical trial researchers. Staff having dual or other prior responsibilities, and lack of professional mix were also mentioned by the EFDA staff as factors that contributed to inefficient trial regulation.

Additionally, staff turnover often due to individuals gaining experience in clinical trial regulation or pursuing further academic qualifications was identified by several researchers as a barrier to trial development. Furthermore, three investigators from other regions reported significant difficulty accessing staff at relevant offices, which resulted in considerable inconvenience, including time delays and financial burdens during their stay in Addis Ababa. Some more barriers such as poor understanding of the importance of clinical trials; not realizing that regulating clinical trials was their duty but rather assuming the staff was doing a favor to the investigators; misunderstanding the current global situation of clinical trials and not considering the country' and global need of medical innovation, and misunderstanding as if the trial benefits only investigators were mentioned by some respondents. One of the researchers endorsed this point by saying

> *"... for EFDA staff, a clinical trial is beneficial only for PIs but not for the country…"RSOBC001*

Three respondents indicated that though the proclamation allowed the involvement of vulnerable groups in clinical trials with justification, the staff tended to reject all trials involving vulnerable populations; and one respondent said the automatic rejection of trials on vulnerable groups without even writing a letter to explain the reason for the rejection could be a barrier to conduct such types of trials in the country.

Difficulty to identify a responsible office or proper direction of whom to contact, during the first visit to submit an application were mentioned as challenges for the new investigators. Even for more senior investigators, as was mentioned by three of the respondents, the frequent change of the staff and office location within the authority and difficulty in identifying the right person for specific issues were also considered to be challenges.

Six of the respondents mentioned that they did not have information about the number of staff, their profession, level of education, and trial reviewing experience.

Challenges related to financial and infrastructure resource

During the time of data collection (January 01, 2020 – April 25, 2020); challenges related to financial resources mentioned by EFDA staff included a lack of budget to organize or attend trial-related training organized by other stakeholders; having only insufficient governmental budget for trial regulation; and lack of support from partners of EFDA who were working in other units of the regulatory body. The absence of a laboratory equipped to test the quality of imported products for clinical trials was identified as a barrier to trial implementation. Additionally, one staff member highlighted infrastructure-related challenges, including insufficient secure and dedicated space for archival purposes, as well as an inadequate office setup.

Challenges related with criteria and guidelines

Criteria:

Having the same criteria for all types of trials and not contextualized requirements with the country's situation and with the type of product to be investigated were mentioned by 5 respondents as barriers to conducting trials on some areas of national need and traditional medicine. As one of the respondents mentioned, having the same criteria for trials conducted by university students as partial fulfillment of their training and trials conducted on new drugs were barriers to encouraging new investigators to conduct clinical trials. One of the investigators mentioned that some criteria were included only for the sake of completing the form leading to extra pressure on investigators rather than protecting trial participants.

However, seven respondents involved mainly in clinical trials funded by international funding organizations responded that there were no unnecessary criteria requested for trial authorization. Some criteria considered unnecessary and difficult to fulfill are described in Table 2.

Table 2: Criteria considered unnecessary and difficult to fulfill

	Criteria	Number of respondents
Difficult to Fulfill	Insurance coverage especially for locally sponsored trials	2
	Manufacturer's credential	1
	For traditional medicine Preparation of investigator brochure, dossier	1
	Good Manufacturing Practice certificate for laboratory-scale production of Ips	1
Unnecessary	Produce data about previous studies in Ethiopia	1
	A pre-requisite to be a PI needs to work as Co-PI	1
	For multi-country trials pre-requiring other countries' Approval	2

Guidelines:

Concerning clinical trial authorization guidelines, many barriers were raised both from the researchers and the regulatory staff which hindered trial development and implementation. The most commonly mentioned challenges by 6 of the respondents were lack of detailed information on the guidelines with specifications for the involvement of vulnerable groups in research, not having clear procedure about the process of trials authorization, and not stating the timetable for each activity undertaken in the review process were stated as a barrier for most of the researchers. One respondent mentioned that the time frame should be stated for each activity;

> *"When should you expect your comments? When should you respond? Within what period you should respond to those comments. And after you submit your comment when do you expect the approval? Those things should be kept clear." RSO-BAH003*

Some challenging factors were shared by both the regulatory experts and researchers. Having impractical guidelines and not having Standard Operating Procedures (SOP) for protocol review were mentioned as barriers by one investigator and an EFDA staff. As few of the respondents mentioned, using the same guidelines for different types and phases of trials like trials on traditional medicine and modern medicine is a barrier to doing clinical trials in Ethiopia.

One of the researchers mentioned the nature of the guideline will lead the EFDA experts to make a personal decision, and another researcher stated lack of detailed information about specific issues on the guideline is a barrier. Lack of specific guidelines for trial materials importation, taking ample time to revise and apply regulation, and not regularly updating the guidelines were also considered barriers by different researchers.

System-related challenges

System-related challenges associated with trial authorization, service fee, product import/export, follow-up inspection, report and feedback provision, product disposal, means of communication, and overall trial regulation system were discussed under this theme.

Challenges related to authorization

Except for three of the respondents, others described the prolonged trial review/approval process as a challenging factor for trial development. The approval process took 2 months up to 2 years as reported by investigators. EFDA staff indicated that the first review response might take 1 to 4 months, while the query response1-4 weeks. One respondent stated that in the case of a multi-country trial, by the time the trial got approval by EFDA, recruitment was completed in other countries.

Few respondents mentioned irrelevant detailed review comments and contradictory comments given by different individuals as barriers. Not having a clear platform for the approval process was also mentioned as a challenge by limited respondents. Requiring hard copy submission of documents and a poor archiving system for trial-related documents were also barriers. Other challenges mentioned for trial authorization were reviewing protocols in a way of faultfinding; not having a joint review system with ethics committees; not involving external reviewers and lack of a system to consult experts in the protocol review process were mentioned by few of the respondents.

Not having a clear guide on where to go and how to apply and no protocol prescreening during submission were pointed as challenges by two of the researchers. One of the respondents reported that not providing a letter of receipt of the application mentioning the date and number of documents submitted made the review follow-up difficult.

The lack of a streamlined approach for amendment was stated as a challenge by one of the researchers, while another researcher mentioned the lack of clear guidelines for approval or rejection of trials as a challenge. The absence of a system to handle researcher complaints and the lack of a system for notifying investigators upon review completion were stated as challenges by some of the researchers.

Challenges related to service fee

More than half of the respondents stated, that not making a distinction between self-initiated or locally sponsored trials from external or industry-sponsored trials, charging the same amount for all trials, and requesting fees to be paid in dollars both for authorization and protocol amendment as barriers that hinder the involvement of national researchers in clinical trials and trial development in Ethiopia.

The amount of the service fee is excess even for sponsors and for self-initiated and/or locally funded trials was stated as a challenging factor by some of the researchers. However, eight of the respondents felt that the fee was fair and reasonable for trials funded by industries or pharmaceutical companies. Bureaucratic and time-consuming payment process which delayed approval and hindered trial implementation was also identified as barriers by half of the researchers. One of the respondents described the amendments fee by saying

" *the number of amendments should be determined by what is needed scientifically not what can be afforded by the project. Otherwise, you know that is a real danger for doing unsafe practice "* RSOBC003

As described by a few researchers, not posting the requirement of service fee and its amount on EFDA's website, paying service charge being a pre-requisite for protocol review, not getting good service compared to the amount paid, deciding service charge related issues without consulting other stakeholders and unwillingness of sponsors to pay this much are existing barriers which affect trial development in Ethiopia. On the contrary, one of the EFDA staff mentioned that the service fee was reasonable compared to that of other countries and the regulatory services given. One of the respondents did not have any information about the service charge.

The regulatory staff also stated not posting on the website and including in the guidelines the updated issues regarding service fees like the possibility of paying in birr for nationally sponsored trials created an information gap.

Challenges related to trial materials import/ export

Though the online product import application system was commendable, the delay in getting product import permission from EFDA and difficulty in following the application progress were mentioned as barriers, not having a complaint handling system for issues related to the online application was also mentioned as a challenge while some researchers in the regions stated in- person application for sample export permit and time taking to obtain the permit were also barriers which cause loss of money and time.

Time taking paperwork at customs, not getting 24-hour service from EFDA at the airport, and delayed product inspection at the port of entry were pointed out to be challenges. EFDA staff working at the port of entry, lacking knowledge about Investigational Products (IPs) was also identified as a challenge by one researcher. As most of the researchers stated, not giving one an export permit for all trial samples to be shipped and requiring one to apply each time makes the sample exportation process much challenging; and the need to apply for import of the same IP each time was stated as barriers by one of the researcher. Also, few researchers point out frequent changing import requirements as a barrier to IP importation.

Not having a separate custom system for trial-related materials import and export, lack of infrastructure to maintain product storage condition at custom, zero level flexibility on custom requirements were also mentioned as challenges

Challenges related to site inspection
The majority mentioned the lack of regular site inspection and follow-up as a barrier while only one of the respondents mentioned that there was regular site inspection from EFDA.

Not being inspected timely, doing only checklist-based inspection, not doing further investigation, not providing onsite support to investigators, and inspecting for fault-finding were pointed out as a challenge.

According to the staff of EFDA, not doing site inspections as planned and not having Standard Operating Procedure (SOP) to prioritize trials for conducting site inspections were also stated as a gap.

Challenges related to report and feedback
Lack of initiative to request investigators/sponsors for reports, not acknowledging the receipt of reports as soon as received from investigators/sponsors, not giving exact/ clear responses about the progress of protocol review, and not giving timely feedback for requests by investigators/sponsors, were stated as challenges related to report and feedback (N=2).

Challenges related to materials disposal
Respondents highlighted several challenges related to materials disposal, including the lengthy process of IP destruction (N=3), the absence of a separate disposal system for trial products, and delays in issuing disposal certificates after disposal (N=2). Additional concerns included the lack of EFDA-licensed drug disposal companies in the country (N=3), the absence of a structured system for drug disposal applications, and difficulties in identifying the responsible directorate for drug disposal.:

> *"They will not come even after repeated application. They don't even consider drug disposal as their responsibility so you have to beg for this also, write a letter, and later there are also issues to get a disposal certificate."* RSOBC001

In contrast, two of the researchers stated that the disposal process was facilitated.

Challenges related to communication
Regarding communication between the researcher and EFDA staff, there are different factors mentioned as a challenge by many of the respondents. For the researchers coming from other regions in the country; personal visits to the office to have clear and up-to-date information; not having electronic means of authorization application; lack of communication via email; and requiring hard copy submission of protocol and periodic reports are challenging factors which will cause loss of money and time of the researchers. Also for most of the researchers; some issues from EFDA like not responding to office phones and nonfunctional official email addresses make communication more difficult.

Lack of clear information on the website about where to go, what to do, and when to get responses on trial authorization, no information about changes made to the trial regulation system; no online system to send review feedback and no online tracing system on the progress of protocol review; the need for frequent in-person visit to shorten the review process; and not having information about the mandate of EFDA on clinical trials were stated as communication challenges

Challenges related to trial regulation
As few of the researchers mentioned, having an inflexible/too stringent review system that did not consider situations; not having a system to control trials conducted without regulatory authorization/ not being vigilant to identify unauthorized trials as factors that demotivate researchers to apply for EFDA authorization and to conduct clinical trials legally. One of the researchers supports this concept by saying

> *"So even at the time we were struggling to get the ethical clearance, researchers were doing clinical trial without getting authorization and any ethical clearance in Ethiopia ..."* RSOBJU002

Having a stringent system is not attractive for external sponsors and/or investigators leading to discouraging collaborative research; misconception of the regulatory body as if it is the only stakeholder caring for the safety of trial participants; not having a system to follow trial results implication/not considering the expected benefit of the trial for the country were stated as challenging to conduct clinical trials. Focusing on research done in Addis Ababa/ giving less attention to trials conducted in regions; not attending meetings organized by investigators/other stakeholders; and not participating in trainings organized by sponsors were mentioned by some as factors that hindered trial development in the country

Prioritized Problems
After identifying the challenges, respondents were asked to prioritize the challenging factors based on the impact they might have on trial implementation and development. The participants prioritized the problem based on their personal experience, because of that one factor can be a

primary challenge for some researchers while being secondary or tertiary for others (Table 3)

Table 3: Prioritized challenging factors

Prioritized level	Challenging factors	Number of respondents
Primary challenging factor	Prolonged approval duration	4
	Staff capacity, number, and attitude	3
	Overall approval process	2
	Hierarchical trial approval process	2
	Unscheduled trial review process	1
	Unnecessary detailed review	1
Secondary challenging factor	Lack of timely site inspection	2
	lack of professional mix of the staff	1
	Lack of an attractive regulatory system	1
	Approval duration	1
	Lack of harmonized review system	1
	Lack of supportive inspection	1
	Not consulting external reviewers	1
Tertiary challenging factor	Lack of trial-type-specific payment	1
	Approval duration	1
	Not facilitated trial material importation	1
	Fault finding nature of inspection	1
	Staffs capacity	1
	Lack of facilitated drug disposal system	1

Discussion

The study aimed to assess the regulatory system enablers and barriers influencing clinical trial development and implementation in Ethiopia, based on interviews with clinical trial investigators and EFDA clinical trial team members. Meetings organized by EFDA to have discussions with investigators were considered good opportunities to help raise issues that need improvement on trial regulation and get information on the updated issues. The attempts done by EFDA to do protocol reviews and site inspections have paved the way for a legal way of trial implementation. Availability and online accessibility of some guidelines prepared by EFDA could provide relevant information encouraging investigators to be involved in clinical trials.

The EFDA staff expressed that efforts made in building staff capacity through long and short- term training will boost the interest of staff working in the clinical trial team and minimize staff attrition. The supplementary guidance on the conduct of clinical trials on medicinal products during the COVID-19 pandemic and guidelines on traditional medicine clinical trials developed recently is highly encouraging and shows its commitment to promoting clinical trials in the country.

Investigators from the selected institutions expressed their appreciation for what EFDA is doing and believed that it would be a good opportunity to develop clinical trials. The strengths of the regulatory system that respondents mentioned will, no doubt, contribute to the introduction of several GCP-compliant clinical trials.

Though there are opportunities and strengths of the regulatory system that help develop clinical trials in Ethiopia, several challenges faced from trial pre-initiation to completion have also been mentioned which might threaten clinical trials that are being developed.

If investigators face challenges right from the outset, i.e., at the level of trial authorization, they will lose interest in clinical trials and shift their interest to other areas of research. The lengthy process for trial authorization can frustrate investigators and the number of clinical trials expected will go down. Not making relevant information available will harm clinical trial development in the country. Though EFDA staff claimed for presence of a help desk to provide appropriate information to newcomers most of the investigators did not agree with this claim.

The lack of expertise, training, and experience of staff at EFDA leading to the lengthy review process reported in our study is in agreement with those of the previous studies (1,12). The findings of the present study are also in agreement with those obtained from a similar study done on a review of regulatory oversight of clinical trials in Africa (13), which identified barriers like the limited number of staff with a limited mix of professions within the clinical trial team which called upon a need for academic improvement to affect protocol review process and the final decision made by the regulatory system. The absence of clear criteria for excluding vulnerable groups in trials and the lack of consideration for global experiences were identified as barriers to generating local data tailored to the country's specific needs. A similar study conducted in Ethiopia highlighted comparable challenges in self-initiated trials, particularly the difficulty of involving vulnerable groups in research (11).

The other major factor mentioned as a barrier by almost all researchers was associated with the service fee for trial authorization including protocol amendments such as payment to be effected in dollars and non-discriminatory amounts irrespective of differences in trial types and sponsors. The requirement to pay the service fee for protocol amendment in dollars might force investigators not to apply for every amendment they made leading to the possibility of unethical practice which might harm trial participants.
The absence of specific criteria for different types, natures, and phases of trials in the regulatory guideline hindered the development of traditional medicines through clinical trials. A systematic review similarly reported that the absence of a clear schedule for each activity in the guideline was a barrier to implementing trials as planned by researchers resulting in sponsors' loss of interest in conducting trials in Ethiopia (6).

In agreement with the findings of a previous qualitative study carried out in Ethiopia to investigate barriers and enablers to the implementation of local investigator-initiated clinical trials (11), most investigators in the present study pointed out that the extended time that issuance of a trial authorization takes leads to delayed trial initiation which is a barrier for the involvement of Ethiopia in multi-national, externally funded and international companies sponsored trials because sponsors and funders lose interest to conduct trials in Ethiopia. The stringent review process carried out sequentially at various levels of ethics committees and feedback will discourage investigators from conducting clinical trials. Similar to that of the study that identified difficulties in conducting clinical trials for AIDS-associated Kaposi's sarcoma in SSA (20), our findings also revealed that lack of coordination between ethics committees and regulatory bodies to harmonize trial protocol review process has delayed trial approval resulting in loss of investigators' interest to be engaged in clinical trials.

Product importation for clinical trials was identified as a significant challenge in trial implementation. The lengthy process of securing import permits for investigational products (IPs) and frequent changes in import criteria have resulted in additional costs and wasted time for investigators and sponsors. A review on vaccine trials in Africa also highlighted that delays in obtaining product import permits contributed to budget constraints due to local currency depreciation (8). After having the permit; customs clearance and product inspection at the port of entry by EFDA staff also took longer time. The absence of a temperature-regulated storage area at the port of entry will result in premature decomposition and damage of the imported products before use incurring additional costs and leading to loss of sponsors' interest to work in Ethiopia. That is why most of the trials are conducted in countries with efficient regulatory systems and customs clearance. This means Ethiopia cannot be competitive in attracting external company-sponsored trials.

The requirement of in-person application for material transfer permit for each material at EFDA headquarters can discourage investigators from outside Addis Ababa from conducting clinical trials as this incurs additional cost and time. The absence of a separate custom system for trial

materials importation also discourages researchers from being involved in clinical trials as this also incurs extra expense, inconvenience, and time wastage.

During trial implementation, the absence of a regularly scheduled site inspection will be a barrier to conducting GCP-compliant trials, i.e., participant protection and data credibility will be serious problems. Even in scenarios where site inspections were conducted, they did not achieve the objectives of inspection as the staff had no experience so it focused on faultfinding. Not giving timely feedback and even not acknowledging the receipt of the reports by EFDA to the SAE and progressive reports as mentioned by most respondents will discourage investigators from sending reports in the future, which has an impact on GCP compliance.

There was also an absence or delay in providing feedback for trial closeout reports which could prolong the trial completion period unnecessarily as regulatory approval is a requirement to complete clinical trials. Not getting feedback on time, requiring a long time for the disposal of the leftover investigational products, and not providing a disposal certificate on time were also barriers to completing trial document compilation on time resulting in frustration.

In contrast to the findings of the previous qualitative study done to assess barriers and enablers to locally-led clinical trials (21), the existence of a regulatory body with legally stated roles and responsibilities was considered to be one of the regulatory strengths in our study.

Conclusion

In a country where a limited number of trials are conducted, many qualitative studies designed to identify the enablers and barriers in the conduct of clinical trials may not be expected, but we believe that our descriptive study will contribute to the improvement of the clinical trial regulation system in Ethiopia. The results of our study suggested that not having a strong, and responsive regulatory system will harm clinical trial development in the country. Though there are opportunities for making the regulatory system stronger, the challenges that investigators/sponsors are facing should not be overlooked. These challenges have to be carefully addressed to encourage the conduct of clinical trials in Ethiopia. Further studies have to be done to measure the impact of each challenge on the development of clinical trials, prioritize the impacts, and come up with recommendations that will enable the increase in the number of clinical trials and facilitate their GCP-compliant conduct in the country

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Declaration of Conflicting Interests

The authors of this study declared that they have no potential conflict of interest.

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Brief Communication

Ten Recommendations for Transforming the Clinical Trials Ecosystem in Ethiopia

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Abstract
As the number of clinical trials conducted in Ethiopia is too small compared to the population size, CDT Africa has established an advisory committee for clinical trials (ACT) composed of the regulatory body, the National Research Ethics Review Board, and the Institutional Research Ethics Review committees, which have received SIDCER recognition. ACT identified the key factors affecting conduct of clinical trials in the country, and recommended i) Reducing protocol approval time; ii) Facilitating trial authorization; iii) Providing training to insurance companies; iv) Establishing national clinical trials networking platform; v) Creating awareness of the public on clinical trials; vi) Providing training to health professionals; vii) Securing adequate financing; viii) Establishing/ strengthening data management center; xi) Implementing the national clinical trials roadmap; and x) Establishing institutional capacity in clinical trials. If these recommendations are implemented, the number of clinical trials conducted in the country, no doubt, will increase.

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Though clinical trials are the primary tool through which new therapeutics are developed, these studies are rarely conducted in developing countries, including Ethiopia. For example, of the overall clinical studies registered worldwide from 2000 to May 2023(n= 454,000) (1), nearly 40% (n=168,520) were from the United States of America (2), while Africa, representing 18% of the world's population and a substantial disease burden, contributes only 2.5% of all clinical trials worldwide (3). To promote the conduct of clinical trials in Ethiopia, an Advisory Committee for Clinical Trials (ACT) has been established. This committee comprises the Ethiopian Food and Drug Authority (EFDA), the chairpersons of the National Research Ethics Review Board(NRERB) of Ethiopia, and a nominated member from the Institutional Research Ethics Review Committees (IRERCs) of various institutes such as the Ethiopian Public Health Institute (EPHI), Armauer Hansen Research Institute (AHRI), Addis Ababa University's Center for Innovative Drug Development and Therapeutic Trials for Africa (CDT-Africa), and College of Health Sciences (CHS) at Addis Ababa University. Upon the advice of the ACT, CDT-Africa conducted a mixed-methods study to identify factors contributing to the low number of clinical trials conducted in the country and to understand what may need to be done to address these challenges and improve the clinical trials ecosystem more broadly. Based on the identified factors, the

ACT has recommended the following to improve the clinical trials ecosystem in Ethiopia:

1. Reducing the lengthy clinical trial protocol approval

The lengthy trial approval process impacts clinical trial delivery in many ways. First, it discourages clinical researchers. Secondly, funders will lose interest and prioritize other countries to implement the study. The fund may also expire while the research team awaits approval. Most importantly, promising interventions will not be readily available to patients. To facilitate the ethical approval process, the following measures were proposed:

-Review of clinical trial protocols should be decentralized to Level A and ethics review committees recognized by the Strategic Initiative for Developing Capacity in Ethical Review (SIDCER). The NRERB should instead focus on developing guidelines and providing training to IRERCs and researchers. Similarly, the EFDA should also focus on regulatory issues.
-Ethics committee members should be well trained, and the committees should meet more frequently to review protocols.

2. Facilitating clinical trial authorization process

The efforts to modernize the regulatory authority and the authorization process are commendable. However, many researchers express frustration over the lengthy clinical trial authorization process. This similarly discourages researchers, funders, patients, and practitioners seeking improved treatment options. To facilitate the regulatory approval process, the following should be addressed:

-The regulatory body's capability needs to be further strengthened. Ensuring that all the staff involved in the clinical trial authorization process are trained and retained is critical.
-The infrastructure of the regulatory body, including appropriate offices, reliable internet access, and online submission and follow-up systems, should be improved.
-More work is needed to enhance the staff's attitude about the relevance of conducting clinical trials. Clear guidelines on clinical trial authorization are required, and awareness among all stakeholders should be ensured.

3. Providing training to insurance companies

Another factor contributing to the smaller number of clinical trials to be conducted in the country is the hesitancy of insurance companies to provide the relevant service for clinical trial participants. Even if they are willing to do so, the premium they give is unreasonably too high, sometimes even more than the budget of the clinical trial itself. This discourages researchers from being involved in clinical trial activities. To address this problem, the following actions are recommended:

-Training should be given to insurance companies to create awareness of the relevance of clinical trials in coming up with better interventions for disease conditions
-Insurance companies should be encouraged to be involved in such exercises
-Experience sharing among insurance companies involved in clinical trial activities should be encouraged.
-Much more work has to be done on the wrong conception of staff working in insurance companies towards the exaggerated risks of participation in clinical trials

4. **Establishing a national clinical trials networking platform**

Only a few institutions are engaged vigorously in the conduct of clinical trials. Creating platforms for networking and experience sharing is likely to encourage other institutions to engage in clinical trials. It was suggested that, as a regional institution and given its experience in organizing the International Clinical Trials Day over the past 11 years, CDT-Africa may be better positioned to take the lead in engaging institutions. Networking, no doubt, plays a significant role in improving the ecosystem of clinical trials in the country.

5. Creating awareness among the public on clinical trials

Trial participants and public engagement (PPE) is a vital instrument for ensuring that clinical trials address the needs of the public (4). The active involvement of patients and the public in the planning, implementation, and dissemination of a clinical trial ensures that the study is aligned with the needs of the population, barriers to participation are addressed, and the benefits of the clinical research are equitably distributed. Methods for ensuring PPE should be developed or adapted as a priority.

6. **Providing training in clinical trials to health professionals**

Increasing the number of health professionals involved in clinical research increases the capacity for conducting clinical trials. Despite their interest, health professionals are reluctant because of a lack of expertise. Offering these health professionals skills-based short-term training in the operation of clinical trials, bioethics, and good clinical practice must also be a priority.

7. **Securing adequate financing for clinical trials**

Clinical trials are expensive ventures by their nature. Some researchers may be able and interested in conducting clinical trials, but they may not have the required finances. This may discourage them. Providing training on how they could secure grants and work with relevant industries will have paramount

importance in solving this problem.

8. **Establishing/strengthening the data management center**
Clinical trials require a strong data management center. Research institutes and universities involved in clinical trials must strengthen and/or establish a strong data management center. Collaboration in this area may also be needed.

9. **Implementing the national clinical trials roadmap**
The national clinical trial roadmap has been prepared by a think tank group established by the Ethiopian Federal Ministry of Health. While having the roadmap is important, it will remain a paper tiger unless implemented. Therefore, the Federal Ministry of Health has a responsibility to implement the roadmap as soon as possible.

10. **Establishing institutional capacity in clinical trials**
Broader institutional capacity to conduct clinical trials, including staff capacity, is crucial. Institutions should equip their staff with knowledge and skills in clinical trials. Advanced regional programs are available in Ethiopia, which should be utilized.

Furthermore, the Data Sharing Act and legal frameworks for clinical trials will also enhance the clinical trial ecosystem in Ethiopia.
If these recommendations are implemented, the number of clinical trials to be conducted is expected to increase substantially.

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Brief Communication

Lessons Learned From The COVID-19 Pandemic on Ethical Review and Regulatory Oversight of Clinical Trials

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Abstract
The COVID-19 pandemic revealed significant challenges and opportunities in the ethical review and regulatory oversight of clinical trials. This paper outlines essential lessons learned, emphasizing the need for adaptable ethical and regulatory frameworks, supported by comprehensive guidelines, to effectively address future public health emergencies.

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Introduction

Following the outbreak of COVID-19 in December 2019, there was an unprecedented global effort to address the overwhelming impact of the pandemic. This led to a significant increase in all areas of research including clinical trials which overwhelmed ethical and regulatory approval processes which were only designed to function within stable research environments. The system faced serious challenges in responding to the higher volume of clinical and public health research during the pandemic.

In the first 100 days of the pandemic, more than 500 Randomized Clinical Trials (RCTs) had already been registered on ClinicalTrials.gov and the World Health Organization International Clinical Registry Platform (1). However, not all of these trials were completed due to several challenges. COVID-19, not only had it brought several challenges to the ethical and regulatory oversight but also brought opportunities with valuable lessons learned to prepare for future similar outbreaks and pandemics.

This article aims to highlight some of the challenges, opportunities, and lessons learned particularly regarding ethical and regulatory oversight of clinical trials during the COVID-19 epidemic.

Challenges

During infectious disease outbreaks of public health importance, health institutions and ministries of health have moral obligations to gather information as rapidly as possible, to inform the ongoing public health response, and to enable scientific evaluation of new interventions being tested.

During the COVID-19 pandemic, the most demanding challenge for ethics committees was the need to accelerate the review process of the protocols submitted to learn more about infectious agents and to inform policy decisions. This raised ethical concerns and necessitated the need to put in place policies and innovative informed consent processes consistent with social distancing. The whole undertaking might have potentially compromised the quality of informed consent processes, including limiting the potential for rigorous or authentic community/stakeholder engagement (2).

In many settings, ethics committees confronted challenges in their deliberations on research ethics, due to the overlapping public and global health ethical issues that emerged alongside and consequent to the COVID -19 pandemic (3). Additionally, the committees encountered complexities in conducting risk-benefit

analysis with the constantly evolving standards of treatment and new data (4) and tried to deal with the various ethical dilemmas related to more complex clinical trial designs, such as adaptive clinical trial design.

The impact was substantial, particularly in clinical trials. The prioritization of COVID-19 research, along with the suspension of non-COVID-related research including therapeutic clinical trials, and research on HIV and TB raised critical questions regarding public health equity(3). There has been discontinuation of trials; suspensions; participant recruitment challenges; resource allocation; changes in guidelines; changing landscape of participants follow -up; exclusive use of virtual platforms; delay in study timelines and increased protocol deviations (5). Similarly, COVID-related trials were also impacted due to the suspension of trials as guidelines were updated. The impact on COVID-19 trials was attributed to social distancing, quarantine, remote follow-up, use of virtual platforms, new and rapidly evolving clinical trial designs, gaps in ethical review guidelines, lack of capacity to review new designs and oversight, and the challenges in separating research activities from clinical service or public health activities (6). Even though COVID-19 has affected low and middle -income countries, efforts in clinical research in these resource-constrained settings were very limited (7).

Opportunities

The increase in research activities during the COVID-19 pandemic has brought meaningful changes in various aspects of health research approaches, through the introduction of new research designs, networking, and harmonization of guidelines.

All stakeholders of research including, ethics committees, regulatory bodies, data monitoring committees (DMCs), and funders have stepped up efforts to the urgency of the situation, with many countries implementing a fast-track procedure for review and authorization of clinical trials (1). It has been shown that adaptive platform trials embedded in routine clinical care have efficiently and largely contributed to evidence generation and created synergies for collaborations. The lockdown and social distancing measures have accelerated the implementation of innovative and remote approaches to conducting clinical trials.

Lessons learned

Drawing from the challenges faced and the opportunities accrued, the following lessons can be recapitulated to bolster future endeavors in clinical and public health research.

1) The health research ethics committees develop procedures to ensure appropriate, expedient, and flexible mechanisms and procedures for ethical review and oversight and expand opportunities for joint or centralized approval processes.

2) Stakeholders and the research community are better off by investing in large-scale clinical trials that can promote international collaboration instead of isolated single-center trials, and coordination can generate more impactful results. The use of adaptive/ platform trial designs and decentralized clinical trials (DCTs) promoted by social distancing has also been recommended for maximizing flexibility in the conduct of trials without compromising their integrity and validity (8).

3)The globalization of clinical trials and the increased opportunity for networking should be harnessed by strengthening the capacity of developing countries for research through training and increasing their engagement in research. Noting that developing countries are marginalized in research activities, especially in conducting clinical trials (9), there is a critical need for enhanced capacity-building efforts. Developing countries have severe gaps in clinical research infrastructure and lack systems for preparedness. Global support is needed to ensure increased opportunity for networking by way of globalization of clinical trials; harmonization of standards; development of responsive systems instituting robust yet flexible regulatory guidelines, enhancing public engagements, capacity building, and international partnerships enabling information sharing and resource utilization. These initiatives should be supported by developing robust national guidelines and leadership in these countries. Within the research community, there is a crucial need for fostering collaboration and coordinated responses to surmount future global public health crises (7).

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Perspective

Evidence-Based Validation of Traditional Medicine in Ethiopia: Challenges and Future Directions

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Abstract
Traditional medicines have huge potential health and economic benefits, with the global traditional medicine currently valued at about US$ 175 billion. However, due to their natural origin and anecdotal reports, there appears to be a misplaced claim of benefit and safety, which is amplified by social media. In this perspective article, we call for the systematic recording and careful validation of traditional knowledge.

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Background
Traditional medicine plays a significant role in the healthcare systems of many countries, particularly developing countries. In Ethiopia, it is estimated that approximately 60-79% of the population uses traditional medicine (1). Traditional medicine also has a vast economic potential. In 2023, the global traditional medicine market was valued at $ 174.89 billion and is expected to grow at an annual rate of 7.5%, reaching $ 289.66 billion by 2030 (2). However, owing to its natural origin and anecdotal reports, the perceived safety and efficacy of traditional medicines seem misplaced. These assumptions have to be tested and validated (3). This perspective examines the barriers to evidence-based validation of traditional medicine in Ethiopia and calls for improved documentation of traditional medicine knowledge, clearer research frameworks, and better coordination efforts.

Challenges to evidence-based validation
Recognizing the significance of traditional medicine, Ethiopia incorporated it into its first national drug policy in 1993. Since then, it has been organized within the Federal Ministry of Health and its various agencies, including the Ethiopian Food and Drug Authority (EFDA), the Ethiopian Public Health Institute (which has now moved to the Armauer Hansen Research Institute), and Regional Health Bureaus. Ethiopia has also commenced the registration and licensing of traditional medicine practitioners (TMPs). A comprehensive national policy on traditional medicine, alongside multiple directives and guidelines, has also been designed to facilitate its validation, regulation, and integration (3,4,5).

One of the main obstacles to evidence-based validation of traditional medicine is the lack of adequate documentation of indigenous knowledge. Much of Ethiopia's traditional medical knowledge is undocumented and is passed down primarily through oral tradition. Most of the available records have been generated only recently, particularly through ethnobotanical and/or ethnopharmacological studies (4,6). Although these recent attempts have cataloged valuable knowledge about traditional medicine, particularly traditional herbal medicine, they have two fundamental flaws in their approach to ethnomedicine.

The first flaw is the narrow scope of these studies,

mainly focusing on the treatment domain of ethnomedicine, particularly herbal medicines, rather than the holistic perspective of ethnomedicine, which explores and documents a broader understanding of health, illness, the body, and the causes of disease, as well as prevention, diagnosis, and treatment.

The second flaw, which partially stems from the limited scope of the available surveys, is the widespread reporting of traditional medicine claims using modern disease terms without adequately explaining how these terms were mapped from traditional to modern disease diagnoses. Given the complexity of translation between traditional and modern medical systems, the ethnomedical knowledge documented in these studies could potentially be misleading and further complicate the validation of traditional medicine (7). Hence, there is a pressing need for a comprehensive and reliable knowledge base that would form the foundation for rigorous scientific investigations.

The epistemological divide between traditional and allopathic (modern/Western) medicine presents an additional challenge in the evidence-based validation of traditional medicines. This problem is particularly exacerbated by Ethiopia's lack of a comprehensive and reliable database of traditional medicine knowledge. The divergence between the holistic approach of traditional medicine to health and modern medicine's linear and reductionist view complicates the design of clinical trials and the translation of traditional medicine practices into modern medical frameworks (8). As such, there is a need for research that combines ethnomedicine with clinical research, such as observational, randomized controlled trials, and single-case design studies that are designed and carried out in collaboration with TMPs (6, 8). Such interdisciplinary research would enable a more comprehensive understanding of traditional medicine and the conversion between traditional and modern medicine systems. This will also aid in the design of high-quality clinical trials for evaluating traditional use claims.

Fragmented research efforts

One of the defining characteristics of the current traditional medicine research landscape in Ethiopia is the fragmentation of research efforts. The various research and associated regulatory efforts are often scattered, and there is no clear coordination among universities, research institutions, TMPs, regulatory agencies, and other government bodies. This lack of alignment has led to duplication of efforts and inefficient use of resources (3). Therefore, enhancing cooperation through the creation of research networks or consortia is essential to hastening the scientific validation of traditional medicine. The creation of collaborative frameworks helps streamline and sustain efforts, align research agendas, and ensure the effective utilization of resources, ultimately enhancing the impact of research efforts. An example of such collaboration is the NEXUS (Network of Excellence for Utilizing Indigenous Medicinal Knowledge Systems) initiative, which aimed at forming a network to introduce effective methodologies for collating Indigenous medicinal knowledge, extend partnerships, strengthen/build capabilities for developing medicinal products from potential medicinal plants, advocate for biodiversity conservation and protection of Indigenous knowledge systems (9).

Regulatory gaps in traditional medicine research

A well-developed regulatory system is an essential factor in realizing the potential of traditional medicine. Despite the advances made, Ethiopia's regulatory landscape does not provide a clear system for the validation of traditional medicines. A notable example in this context is the lack of clinical trial guidelines for traditional medicine. Although drafted, the guidelines have yet to be ratified (3, 10). Moreover, there is a lack of a clear and consistent regulatory definition of what constitutes traditional medicine. There is a wide array of terms used in proclamations, policies, directives, and guidelines that could be interpreted in different ways, such as "traditional drugs", "traditional medicine products", "traditional medicine and alternative and complementary medicine", "traditional medication", and "herbal medicines". Existing regulatory documents are narrowly focused on medicines or products, particularly herbal medicines, while other types of traditional medicine, mainly procedure-based traditional medicine practices, are unaddressed. Generally, there is a lack of conceptualizing traditional medicine as a system of medicine with all its domains similar to its modern counterpart. Given the holistic nature of traditional medicine practices, regulatory guidelines must capture the complexities of traditional medicine, enabling the study of this field not only within the theoretical frameworks of modern medicine but also within its own theoretical frameworks.

Addressing challenges to evidence-based validation

We have proposed three major approaches to increasing the potential and evidence-based utilization of traditional medicines: developing a high-quality national database of traditional knowledge, strengthening collaboration among stakeholders, and enabling regulatory systems (Box 1)

1. Develop a high-quality national Indigenous knowledge repository and evidence-base

- Launch a national community-based recording or documentation initiative.
- Promote high-quality interdisciplinary ethnographic studies, and studies that integrate ethnomedicine with clinical research, and clinical trials.
- Standardize and curate generated knowledge and evidence into a publicly accessible national database.
- Allocate sustained funding for long-term research and capacity building, while encouraging public-private partnerships to leverage additional resources.

2. Strengthen collaboration and coordination among stakeholders

- Establish a dedicated body that will serve as a national hub for research and collaboration.
- Establish multi-stakeholder research consortiums and regular engagement forums.
- Foster interdisciplinary collaboration between TMPs, health professionals, and researchers.

3. Develop an enabling regulatory system

- Enhance the capacity of the regulatory authority with trained personnel and infrastructure.
- Strengthen the clinical trials ecosystem and quality control mechanisms.
- Formulate clear and inclusive guidelines, including clinical trial guidelines, that account for the unique complexities of traditional medicine.

Box 1: Recommendations for addressing the challenges of evidence-based validation of traditional medicine.

Conclusion

Ethiopia faces numerous challenges in the evidence-based validation of traditional medicine, including inadequate documentation of traditional medicine knowledge, fragmented research efforts, and regulatory gaps. Without addressing these challenges, the opportunities presented by centuries of indigenous knowledge and unique biodiversity will be lost.

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Founded in 1950 as the University College of Addis Ababa, Addis Ababa University (AAU) has grown into Ethiopia's oldest, largest, and most prestigious institution of higher learning. Renamed Haile Selassie I University in 1962 and later adopting its current name in 1975, AAU has played a foundational role in the country's academic, social, and political life. It has been established as an autonomous University by the virtue of Council of Ministers Regulation No. 537/2023.

Located in the heart of Ethiopia's capital, AAU is a hub for transformative education, cutting-edge research, and impactful engagement. The university's vision is to become a leading research university in Africa, driving national priorities and responding to global development needs. Its mission is to pursue transformative learning, world-class innovation, and community service that advances the socio-economic, cultural, and technological aspirations of the country and continent.

AAU offers 66 undergraduate and over 350 postgraduate programs. It also provides 32 subspecialty and 23 specialty certificate programs in the health sciences. Academic programs are distributed across 7 colleges and one law school, each fostering excellence in diverse fields, from humanities and business to health and computational sciences. The recent academic restructuring has aligned AAU's various academic units with national development goals. The current structure includes the following colleges and school:

- College of Social Sciences, Arts, and Humanities
- College of Technology and Built Environment
- College of Health Sciences (housing the Tikur Anbessa Specialized Hospital)
- College of Veterinary Medicine and Agriculture
- College of Education and Language Studies
- College of Business and Economics
- College of Natural and Computational Sciences
- School of Law

Research is central to AAU's mission. The university houses seven leading research institutes, including the Institute of Geophysics, Space Science & Astronomy, the Aklilu Lemma Institute of Pathobiology, and the Institute of Ethiopian Studies (IES), home to the Ethnological Museum, and a vast national archive. These institutes address critical challenges in health, security, environment, and culture, while building evidence-based policy solutions.

AAU is also a cultural powerhouse. Through the Alle School of Fine Arts and Design, Yared School of Music, and Ashenafi Kebede Performing Arts Center, the university nurtures Ethiopia's rich artistic legacy. The National Herbarium and IES Museum further enhance AAU's role as a guardian of national heritage.

The university boasts 13 campuses (12 in Addis Ababa and one in Bishoftu), serving a diverse student body of over 33,000, including international students. Its vibrant campus life includes student organizations, modern libraries, research labs, and recreational spaces.

Internationalization is a strategic pillar of AAU. With partnerships across the world, AAU actively collaborates on global research, academic exchange, and capacity building.

Guided by its core values, excellence, innovation, academic freedom, integrity, diversity, and public responsibility, AAU continues to shape Ethiopia's future and contribute meaningfully to Africa's development.

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