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**English Language Editor
Gemechu Hinika**



Climate Change Impact on Sorghum: Model-Driven Projections and Adaptation Strategies for Resilient Future

Dereje Reta¹, Girma Asefa¹, Mengistu Mengesha¹, and Alemnesh Bekele¹

¹College of Agriculture and Environmental Science, Haramaya University, Haramaya, Ethiopia

Key Messages

- Average annual rainfall of Babile and Fedis districts is projected to decline by 35% and 58%, respectively, accompanied by an increase in temperature of 4.1°C in 2080. This is expected to significantly reduce sorghum yields in the area.
- Planting outside the optimal sowing window leads to major yield losses, with early planting (before 15 June) causing reductions of around 5–7% and late planting (after 10 July) lowering yield by 21%.
- Erer 01 variety demonstrates the highest climate resilience, achieving a yield increase of around 12% in Babile and 6% in Fedis when planted at the optimal date.
- Warming shortens sorghum growth periods, reducing days to anthesis and maturity by 11–37 days, which increases heat stress and limits biomass accumulation.
- Climate-smart practices such as optimal planting dates, appropriate fertilizer application, and use of resilient cultivars can offset part of the projected yield losses, with improvements of around 11.7% for Melkam and 12.2% for Erer 01 under favorable conditions.

Introduction

Cropping system models play a vital role in evaluating sustainable production strategies and assessing how climate change affects crop yields. Crop models integrate plant eco-physiological

processes, and both environmental, and management options for different cultivars and locations. Decision Support Systems for Agrotechnology Transfer (DSSAT) is one of the most widely validated platforms for analyzing climate impacts and testing adaptation strategies, having demonstrated reliable performance across diverse global environments.

In Ethiopia, sorghum is the third most important cereal crop after tef and maize, supporting millions of smallholder farmers. Despite its drought-tolerance, sorghum productivity remains low due to climate variability, suboptimal agronomic practices, and socioeconomic constraints—challenges that are particularly acute in the drought-prone regions of Eastern Ethiopia.

The East Hararghe Zone, including Babile and Fedis districts, faces frequent droughts, erratic rainfall, land degradation, and climate-related shocks that have reduced crop productivity and increased household vulnerability. Because smallholder farmers rely on rain-fed production and traditional management, sorghum yields are highly sensitive to shifts in rainfall patterns, rising temperatures, and soil moisture stress. Given that future climate impacts vary across locations and crop varieties, there is an urgent need for

localized assessments that quantify how sorghum production will respond to projected climate conditions. This study aimed to evaluate the impacts of projected climate change on sorghum yield to identify agronomic adaptation strategies and strengthen the climate resilience of communities in Eastern Ethiopia.

Approaches and Results

The study used the DSSAT crop model to evaluate how future climate scenarios affect sorghum production in Babile and Fedis districts. Historical weather, soil, and crop data were compiled, and future climate projections were downscaled from CORDEX-Africa models. Four sorghum varieties were calibrated and validated using field experiments, and simulations were run to assess yield responses under RCP4.5 and RCP8.5 climate scenarios.

The study analyzed 1990–2021 climate data and used eight GCM ensemble projections under RCP4.5 and RCP8.5 for the 2050s and 2080s to simulate sorghum

performance in Babile and Fedis districts. The CERES-Sorghum model accurately represented crop development and yield, showing strong agreement between simulated and observed values across all varieties and locations.

Future climate projections for the Babile area indicate a clear warming trend under both emission scenarios. By the 2080s, the RCP8.5 scenario is projected to produce the strongest warming, with maximum temperatures increasing by up to 4.1°C and minimum temperatures by approximately 2.7°C, exceeding changes projected under RCP4.5. In contrast, annual rainfall projections exhibit mixed patterns. While both districts face declines, the severity varies: in Babile, rainfall is projected to decrease significantly by 35.24% under RCP4.5 by the 2080s, whereas Fedis is expected to experience a much sharper reduction of 58.2% under the same scenario and timeframe (Table 1). These shifts align with regional studies showing declining rainfall trends across Ethiopia.

Table 1: Descriptive statistics of annual changes in rainfall and temperature.

Babile District							
Scenarios	Period	Annual RF in (mm)	ΔRF in %	T _{max} (°C)	T _{min} (°C)	ΔT _{max} (°C)	ΔT _{min} (°C)
Baseline	1990-2021	754.02		29.1	17.4		
RCP4.5	2050s	554.4	-26.47	30.9	17.4	1.8	0.0
RCP4.5	2080s	488.3	-35.24	31.4	18.0	2.3	0.6
RCP8.5	2050s	760.0	0.79	31.6	18.0	2.5	0.6
RCP8.5	2080s	697.7	-7.46	33.2	20.1	4.1	2.7
Fedis District							
Baseline		908.7		27.6	14.6		
RCP4.5	2050s	769.3	-15.3	29.4	16.5	1.8	1.9
RCP4.5	2080s	380.0	-58.2	29.9	17.1	2.3	2.5
RCP8.5	2050s	588.3	-35.3	30.0	17.2	2.4	2.6
RCP8.5	2080s	896.2	-1.4	31.7	19.2	4.1	4.6

Simulated crop growth responses indicate that sorghum phenology will generally be shortened across most scenarios, characterized by a reduction in the number of days to anthesis and physiological maturity. However, certain exceptions emerged: Melkam variety showed stable anthesis under RCP4.5 in the 2050s, while Fedis-01 and Erer-01 exhibited unchanged anthesis under RCP8.5 in both the 2050s and 2080s (Table 2). These exceptions suggest significant varietal differences in heat tolerance within the Babile district. Conversely, in Fedis, growth phases are projected to be either accelerated or delayed, depending heavily on the specific variety and climate scenario.

Table 2: Projected yield change (%) for varieties under different planting windows in the 2050s and 2080s (RCP 4.5 and 8.5) in Babile District.

Varieties	Baseline yield (kg/ha)	Planting windows	RCP4.5		RCP8.5	
			2050s	2080s	2050s	2080s
Melkam	2500	15-June	-5.3	-2.4	-6.9	-2.8
		25-June	11.7	8.7	2.1	1.8
		10-July	-4.1	-5.6	-4.3	-1.2
Teshale	2556	15-June	-4.1	-1.5	-1.8	-2.6
		25-June	9.7	-1.6	4.3	-5.4
		10-July	2.4	3.7	7.2	4.9
Erer-01	2278	15-June	-4.3	-6.4	-7.1	-3.7
		25-June	12.2	4.7	12.1	2.7
		10-July	-21.1	-13.6	3.3	-1.2
Fedis-01	2166	15-June	5.3	-5.5	4.5	2.6
		25-June	-7.3	-6.6	4.1	-3.7
		10-July	3.1	4.7	7.2	3.3

Climate change projections indicate a decline in sorghum yields across both districts, particularly when planting occurs before June 15. Early sowing consistently resulted in yield reductions across all varieties, scenarios, and timeframes, confirming that elevated temperatures and moisture stress during early developmental stages significantly reduce productivity. Similarly, late planting (after July 10) led to substantial yield losses, as rainfall typically ceased before the crop reached critical reproductive stages—a trend observed across all varieties in both districts (Tables 2 and 3).

These findings align with previous regional studies indicating that both early-season droughts and late-season moisture deficits are primary drivers of reduced sorghum yields in East Africa.

Optimal planting dates varied slightly by district but generally centered around 25 June, which improved yields, especially Melkam, Teshale, and Erer 01 in Babile and all varieties planted in Fedis. Under RCP4.5, peak improvements reached +11.7% for Melkam and +12.2% for Erer 01 in the 2050s. Under RCP8.5, benefits were smaller but still positive for several scenarios (Tables 2 and 3).

Table 3: Projected yield change (%) for varieties under different planting windows in the 2050s and 2080s (RCP 4.5 and 8.5) in Fedis District.

Varieties	Baseline yield (kg/ha)	Planting windows	RCP4.5		RCP8.5	
			2050s	2080s	2050s	2080s
Melkam	3277	15-June	-3.7	-4.4	-1.1	-3.2
		25-June	3.3	-6.3	-13.1	4.2
		10-July	-16.1	-9.6	-21.3	-4.8
Teshale	2777	15-June	-5.1	-3.5	-8.8	-8.6
		25-June	4.7	3.6	3.3	1.7
		10-July	7.2	-8.7	4.2	-4.9
Erer-01	2722	15-June	-9.7	-5.5	-0.4	-2.1
		25-June	5.3	6.1	-6.3	4.3
		10-July	-13.3	-17.5	-14.1	5.3
Fedis-01	3500	15-June	-2.1	-3.5	-3.8	-8.6
		25-June	1.4	1.6	2.3	1.2
		10-July	6.1	-13.7	5.2	1.9

Overall, the model results showed that climate change will increase heat and water stress in both Babile and Fedis, reducing sorghum yields unless adaptive practices are implemented. Strategic adjustments, including shifting planting windows toward late June, selecting resilient varieties such as Erer-01, and optimizing management-can minimize climate-induced losses and strengthen sorghum production resilience. A climate-smart management package oriented around optimal sowing dates and appropriate cultivar selection will be essential for safeguarding future yields in Eastern Ethiopia.

Policy Recommendations

- Ministry of Agriculture and regional bureaus should lead the rollout of climate-resilient sorghum varieties by coordinating district-level adoption programs and similar agro-ecologies.
- Agricultural research institutes and seed enterprises should ensure consistent production and distribution of climate-ready varieties, prioritizing Erer-01 for both Babile and Fedis and similar agro-ecologies due to its demonstrated resilience and stable performance under future climate scenarios.
- Ministry of Agriculture should promote evidence-based climate planning by integrating advanced crop modeling tools into routine decision-making, enabling policymakers to evaluate climate risks, crop rotations, and soil health interactions more effectively.
- Ethiopian Meteorological Institute and extension agents should provide targeted training for farmers on variety-specific management and tailored advisory services to maximize yield gains under projected climate conditions.



Evidence-Based Calf Health Plan Improves the Health and Performance of Dairy and Camel Calves

Yihenew Getahun¹, Ambachew Motbaynor¹, Shihun Shimelis¹, and Mina Ali¹

¹College of Veterinary Medicine, Haramaya University, Po. Box 138, Dire Dawa, Ethiopia

Key Messages

- A daily calf health plan substantially reduced disease and death, lowering morbidity to 29.5% and mortality to 10.4% compared with routine management.
- Feeding colostrum within six hours markedly improved survival, reducing morbidity by 52% and mortality by 66%.
- Calves ≤ 3 Months faced higher risks of illness and death, underscoring the need for stronger early-age care.
- Male calves experienced approximately double the morbidity risk of females, indicating uneven management attention.
- The health plan improved growth performance: increasing daily weight gain (4.4%) and weaning weight (4.5%).

Evidences indicated that dairy calf morbidity and mortality rates in Ethiopia reach 47.3% and 17.9%, respectively, while camel calf morbidity and mortality rates were about 35% and 9%, respectively. These losses threaten herd replacement, productivity, and the long-term sustainability of dairy and camel value chains.

The economic implications are considerable due to losses arising from calf deaths, treatment costs, reduced growth performance, and decreased lifetime milk productivity. Research further indicates that improved calf management practices, including timely colostrum feeding, better housing, hygiene, and disease prevention, can substantially reduce calf health problems and enhance performance outcomes. Given the national focus on livestock intensification and dairy sector transformation, reducing calf morbidity and mortality is essential. Calf health and performance improvements can be achieved through the development and application of sound dairy and camel calf health and management practices. Practical, evidence-based calf health plans offer a feasible, high-impact pathway to support Ethiopia's dairy and camel production goals.

Introduction

Ethiopia has prioritized the expansion of commercial and smallholder, market-oriented dairy production systems to meet the rapidly growing national demand for milk and dairy products. In lowland pastoral and agro-pastoral areas, camels also provide essential milk and income, particularly under low-rainfall conditions. However, the success of these national livestock initiatives is increasingly constrained by the high burden of calf morbidity and mortality.

Approaches and Results

A randomized controlled trial was conducted from February to October 2023, in dairy farms in Dire Dawa and Harar to assess the impact of an evidence-based daily calf health plan on morbidity, mortality, and growth. One hundred thirty-seven (137) pregnant cows (≥ 8 months gestation and consented) were selected. After calving, newborns were randomly assigned to an intervention group (structured daily calf health plan) or a control group (routine practices). Calves were followed weekly for six months. Health events, including birth and weaning weights, and average daily weight gain (ADWG, via rondo-tape), were recorded alongside farm management factors (colostrum timing, housing, age-mixing, hygiene, and equipment cleaning).

The cumulative probability of morbidity was 24% in the intervention group and 40% in the control group, and mortality was 13% and 24%, respectively, indicating superior survival in the intervention group. The rates of incidence, morbidity, and mortality were reduced as a result of the intervention: morbidity was 29.53% compared to 49.34% (control), and mortality was 10.42% compared to 19.75% (control).

Significant predictors for mortality and morbidity include treatment group, sex, age, and colostrum timing. Calves in the control group were nearly three times more likely to die (HR = 2.78); early colostrum ingestion reduced death risk by about two-thirds (HR = 0.34), and calves three months old or younger had more than three times the risk of dying (HR = 3.61). Male calves were about twice as likely to get sick (HR = 2.03), while giving colostrum within six hours reduces sickness risk by about half (HR = 0.48).

Growth performance improved under the plan: average daily weight gain was 0.776 ± 0.095 kg in the intervention group vs 0.743 ± 0.069 kg in controls ($p=0.042$), and weaning weight was 154.37 kg vs 147.73 kg ($p<0.001$) (Table 1). Results confirmed other interventions and ≥ 3 L/day milk intake as positive predictors of ADWG.

Table 1: Birth weight, weaning weight, and daily weight gain of calves.

Weight in Kg	Control group (mean $\pm$ SD)	Intervention group (mean $\pm$ SD)	t-test	p-value
Birth weight	34.616 $\pm$ 4.241	34.966 $\pm$ 4.700	-0.457	0.648
Weaning weight	147.727 $\pm$ 4.361	154.373 $\pm$ 6.579	-6.172	<0.001*
Average daily weight gain	0.743 $\pm$ 0.069	0.776 $\pm$ 0.095	-2.056	0.042*

Camel calf morbidity has decreased from 50.39% in the control groups to 32.21% in the intervention groups. The mortality rate also decreased from 15.06% in the control group to 5.97% in the intervention group (Figure 1).

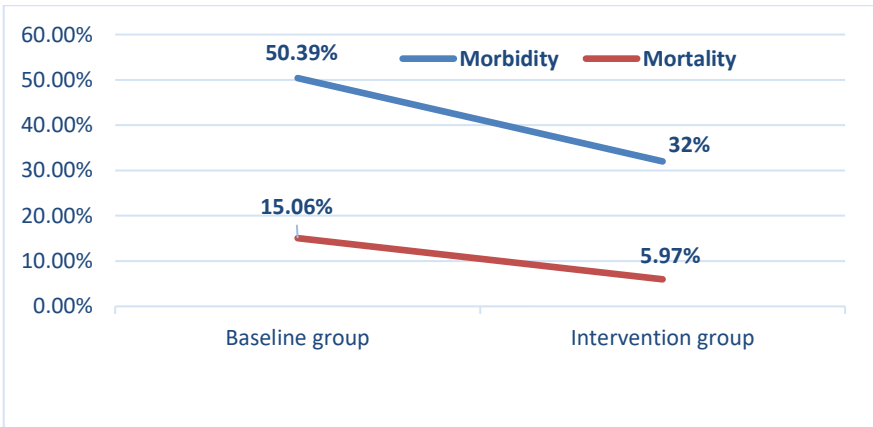


Figure 1: Morbidity and Mortality rate in baseline and intervention groups of calves.

Diarrhea and pneumonia were the most common disease conditions in both groups, though both were lower in the intervention group (Figure 2).

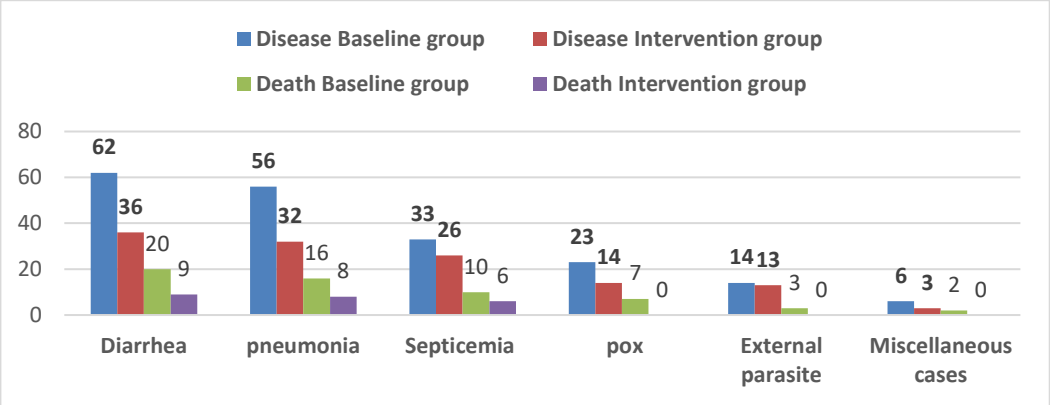


Figure 2: Morbidity incidence rate in the two groups of calves.

The weaning weight of calves in the intervention group (105.22 ±3.1kg) was significantly higher compared to the Control group 96.43 ±2.4) (Table 2).

Table 2: Birth, weaning, and daily weight gains of camel calves.

Weight in KG	Baseline group (mean ± SD)	Intervention group (mean ± SD)	t-test	P value
Birth Weight	34.31 ±0.94	34.26 ±0.92	0.54	0.613
Weaning Weight	96.43 ±2.4	105.22 ±3.1	-98.25	<0.001
Mean Daily Weight Gain	0.23 ±0.01	0.26 ±0.02	-0.37	0.714

The study demonstrated that applying an evidence-based calf health plan substantially improves pre-weaning survival and growth. The marked reductions in morbidity and mortality reinforce the central role of early colostrum ingestion, hygiene, and structured calf-rearing routines. The stronger effect in younger calves reflects their heightened vulnerability due to immature immunity. Growth gains higher ADWG and greater weaning weights show that better early-life management translates into improved productivity. These findings collectively show that calf health plans are not only lifesaving but also economically beneficial for dairy producers. In sum, a structured daily calf health plan enhances survival, reduces disease, and improves growth, offering a practical pathway to strengthen Ethiopia’s dairy systems.

Policy Recommendations

- Ministry of Agriculture and regional Agriculture Bureaus should promote widespread adoption of the daily calf health plan to reduce preventable calf losses.
- Relevant stakeholders should provide awareness and training on timely colostrum-feeding within six hours of birth.
- Veterinarians and animal production development agents should train farmers and farm attendants on early-age calf care, hygiene, and equal management of male and female calves.
- Local administrations and development agencies should support farms to maintain clean calving pens, proper bedding, and clean feeding equipment using low-cost, practical methods.



Zoonotic Risk Exposure in Swine Farming: Insights from a Case Study in Eastern Ethiopian Farm

Adem Hiko¹, Feyisa Aliye¹, Abdallahi Abdurehman¹, and Sisay Girma¹

¹College of Veterinary Medicine, Haramaya University, Po. Box 138, Dire Dawa, Ethiopia

Key Messages

- The swine farm showed a high burden of enteric zoonosis, with 27.55% *Salmonella* and 57.14% *E. coli* detected in the sampled farm.
- Wild birds contributed additional contamination risks, carrying 40% *Salmonella* and 70% *E. coli* in their fecal samples.
- Co-occurrence of both pathogens was observed in 21.43% of samples, indicating multiple contamination sources.
- Awareness of zoonotic diseases among farm workers was generally low, with fewer than 40% demonstrating knowledge about the zoonotic risks associated with common enteric pathogens.

Introduction

Global pork production has been increasing in the last few decades, driving the intensification of swine husbandry in many parts of the world. This trend has resulted in fewer but larger production facilities, each accommodating significantly more animals. As herd sizes have expanded and management practices have been challenged, the swine industry has experienced a notable rise in the detection of infectious agents. Fournié et al. (2015) documented 77 pathogens not previously reported in pigs before 1985, including 39 viruses and 32 bacterial species, with the top 20% of pork-producing nations accounting for 82% of these emerging agents. Of these newly identified pathogens, 30 (39%) are zoonotic.

These changes suggest that demographic shifts in swine production, especially in settings lacking adequate biosecurity, may contribute to the increased emergence and transmission of swine-associated zoonoses.

Most swine-associated zoonotic pathogens are transmitted through the fecal–oral route. Although *E. coli* is normally harmless to animals, it is widely used as an indicator organism for monitoring enteric pathogens in swine production systems. Salmonellosis linked to pork is also an important public health concern. An estimate of 1% to 25% of Salmonellosis in humans originated from pork or pork products. However, such data are limited for Ethiopia. Given the increasing intensification of swine farming and gaps in biosecurity, understanding the burden and distribution of enteric pathogens in pig farms is essential for reducing zoonotic risks. Therefore, this study aimed to identify potential sources of enteric pathogens, specifically *Salmonella* and *E. coli* and assess swine herd management practices at the Haramaya University Swine Farm.

Approaches and Results

The study was conducted at the Haramaya University Swine Farm using a purposive sampling method. Fecal samples were collected from all 146 pigs. Additional specimens were systematically collected from feed, drinking water, swine-pen surfaces, workers' facilities, cleaning tools, and fecal droppings of wild birds wandering around the farm.

All 25 farm workers were also surveyed to assess management practices, hygiene behaviors, and awareness of the zoonotic risks of *Salmonella* and *E. coli*. Samples were transported under chilled conditions to the Veterinary Microbiology and Public Health Laboratory and processed following ISO 6579 (2017) for *Salmonella* and standard protocols for *E. coli* (ISO, 2017; Hirsh, 2003). Questionnaire data were collected in Amharic and/or Afaan Oromo. Laboratory and survey data were analyzed using STATA 14, with Pearson’s chi-square used to test prevalence differences across risk factors ($p < 0.05$) and between the two pathogens ($p < 0.01$).

The overall prevalence of *Salmonella* and *E. coli* across all sample origins were 27.55% and 57.14%, respectively. Among the pig fecal samples analyzed, *Salmonella* was detected in 25.34% and *E. coli* in 50%, depicting that pigs themselves served as important reservoirs for both pathogens (Table 1).

Salmonella prevalence did not vary significantly across sample origins ($p = 0.63$), whereas *E. coli* prevalence did ($p = 0.03$). When the two pathogens were compared directly, the overall prevalence indicated that *E. coli* was significantly more prevalent than *Salmonella*, and within every sample category, demonstrating its stronger environmental persistence and broader distribution throughout the farm.

Salmonella was detected in 31.75% of environmental samples and *E. coli* in 68.25%, including swabs from pig houses, floors, garden soil, workers’ boots, and facility surfaces (Table 1). Although *Salmonella* was absent on worker aprons and cleaning brushes, *E. coli* was found on some of these items, suggesting human-associated pathways for pathogen dissemination.

Table 1: Occurrence of *Salmonella* and *E. coli* by sample origin.

Sample Origin	No. of Examined Sample	No. (%) Positive for		χ^2 **	p-Value **
		<i>Salmonella</i>	<i>E. coli</i>		
The pigs	146	37 (25.34)	73 (50.00)	18.90	<0.001
Feed and drinking water	85	24 (28.24)	52 (61.18)	18.66	<0.001
Environment	63	20 (31.75)	43 (68.25)	16.79	<0.001
Total	294	81 (27.55)	168 (57.14)	52.73	<0.001
χ^2 *		0.93	6.78		
p- value *		0.63	0.03		

* At 95% confidence interval across the risk factors; ** at 99% confidence interval between the *Salmonella* and the *E. coli* isolation within the considered risk factor.

Feed and drinking water also showed contamination, with *Salmonella* present in 17.95–36.96% of samples and *E. coli* in 50–74.40%, indicating that both contributed to pathogen exposure risks for pigs. Wildlife contact emerged as an additional concern. Fecal samples from wild birds visiting the farm contained *Salmonella* in 40% and *E. coli* in 70% of the samples. These findings align closely with the later survey results showing that 92% of workers acknowledged the absence of any wild-bird entry control on the farm.

Co-occurrence of both pathogens was common: 21.43% of all samples were positive for both *Salmonella* and *E. coli*, reflecting overlapping routes of contamination and the presence of multiple transmission pathways across sample types, environments, and animal groups. Additional analyses showed that contamination varied across pig housing units. *Salmonella* prevalence ranged from 18.84% to 40% in seven of the eight pig houses, with one house testing negative, whereas *E. coli* was detected in 49.30–80.00% of pigs in all the eight houses.

Management and worker-behavior data further explained the microbiological findings. Eighty-four percent of workers reported keeping pigs in separate houses, and 72% reported receiving veterinary care for the animals. Eighty percent of respondents reported no rodent or insect control, 60% indicated they did not use exclusive farm footwear, and 68% stated they never washed their hands or used a footbath before entering pig areas. Knowledge about zoonotic transmission was low: only 28% of workers recognized the zoonotic potential of *Salmonella*, and 36% recognized that of *E. coli*. These knowledge gaps, combined with inadequate hygiene practices and uncontrolled wildlife access, created conditions conducive to pathogen maintenance and spread.

The combined evidence: microbiological prevalence, environmental contamination patterns, wildlife involvement, and worker practice data indicates a high-risk ecosystem where pathogens can persist and circulate among pigs, humans, and the farm environment. Contamination of feed, water, animal-contact surfaces, and natural wildlife reservoirs suggests that pathogen control requires interventions targeting multiple transmission points rather than focusing solely on the pigs.

The study demonstrates systemic contamination by *Salmonella* and *E. coli* across pigs, feed, water, environmental surfaces, and wildlife, driven by inadequate biosecurity, inconsistent worker hygiene, and insufficient control of wild birds and rodents. The significantly higher prevalence of *E. coli* highlights its environmental resilience, while the notable co-occurrence of both pathogens across sample types underscores the complexity of transmission pathways on the farm.

Policy Recommendations

- Ministry of Agriculture and Animal Health Institute should strengthen basic farm hygiene and biosecurity practices to reduce *Salmonella* and *E. coli* transmission risks.
- Swine farms should implement regular cleaning schedules and simple environmental controls to limit contamination from feed, water, and housing areas.
- Farm owners should consider the restriction of wild-bird and rodent entry in the swine farm.
- Veterinarians should provide awareness and practical training to farm workers on zoonotic risks and essential hygiene behaviors.



Widespread Non-Prescribed Antibiotic Access and Misuse Practice in Eastern Ethiopia: A Growing Threat to Public Health

Dumessa Edessa^{1,2}, Fekede Asefa^{2,3}, Girmaye Dinsa^{2,4}, and Lemessa Oljira²

¹School of Pharmacy, College of Health and Medical Sciences, Haramaya University, P. O. Box 235, Harar, Ethiopia.

²School of Public Health, College of Health and Medical Sciences, Haramaya University, Harar, Ethiopia.

³University of Tennessee Health Science Center-Oak Ridge National Laboratory (UTHSC-ORNL) Center for Biomedical Informatics, Department of Pediatrics, College of Medicine, Memphis TN, USA.

⁴Fenot Project, Department of Global Health and Population, Harvard T. H. Chan School of Public Health, Addis Ababa, Ethiopia.

Key Messages

- About 45% of recent antibiotic users accessed antibiotics inappropriately, while 51% used antibiotics unnecessarily.
- Children under five had 1.48 times higher risk of unnecessary antibiotic user compared to other age groups.
- Rural residents were 26% more likely to misuse antibiotics than urban residents.
- Individuals with no formal education and a primary level had a higher likelihood of unnecessary use of antibiotics by 34%.
- Kiosks and drugstores were major sources of non-prescribed antibiotics, with kiosks linked to 32% higher misuse risk.

Introduction

Globally, antibiotic use has increased by 46% over the last two decades, with a notable surge observed since the onset of the coronavirus disease (COVID-19) pandemic. Although antibiotics are essential for preventing and treating bacterial infections, their use in resource-limited countries may be largely unnecessary. Studies report that more than 50% of antibiotics used to treat acute upper

respiratory tract conditions are unnecessary, and systematic reviews show that over 40% of self-limiting diseases are treated with antibiotics without justification.

Unnecessary antibiotic use is the primary driver of antimicrobial resistance (AMR), which caused 1.27 million deaths and contributed to 4.95 million deaths globally in 2019. Despite global initiatives advocating prudent antibiotic use, Africa continues to record the highest AMR-related mortality rate. The World Health Organization (WHO) has prioritized research on community-level antibiotic use, and Ethiopia has committed to strengthening evidence through surveillance and studies.

In Ethiopia, despite the expected role of drug providers in advising patients on responsible antibiotic use, there is a growing practice of accessing antibiotics without prescriptions, including from unlicensed sources, and using them unnecessarily. Antibiotic stewardship efforts have so far been limited to health facilities, overlooking community-level practices. Therefore, this community-based study addresses these gaps by examining antibiotic use behaviors from the users' perspective, providing evidence to inform tailored stewardship strategies.

Approaches and Results

A community-based cross-sectional study was conducted in rural Haramaya and Harar town, involving 2,256 households selected through stratified cluster sampling. Antibiotic access was considered inappropriate if obtained without a prescription or from unlicensed sources. Unnecessary antibiotic use refers to consumption for non-bacterial infections (e.g., colds and flu) or for bacterial infections that do not always require antibiotics. Antibiotic use was assessed using a published classification scheme for antibiotic necessity based on the International Classification of Diseases-10 Clinical Modification (ICD-10-CM), with unnecessary use recorded if associated with unjustified diagnosis codes. Predictors of inappropriate antibiotic access and unnecessary use were identified using appropriate statistical models.

The majority of the respondents were female (83.8%), in the age group 20-39 years (59.8%), married (79.9%), and rural residents (61%). Nearly half of the respondents had no formal education (45.5%) and were housewives (46.7%) (Table 1).

Out of 1,245 individuals who recently received antibiotics, 567 (45.6%) accessed them inappropriately, and 636 (51.1%) used them unnecessarily. Obtaining medicines without a prescription was about three times higher among people who lived in urban areas ($\beta=3.21$). The absence of needed drugs in public health facilities ($\beta=2.32$), inconvenience in healthcare services ($\beta=1.27$), and having no community-based health insurance ($\beta=0.75$) at public facilities also increased "linked to" (because $B=0.75$ is not show an increasing trend) the chance of inappropriate access to antibiotics. Additionally, getting medicines from unlicensed sources was about two times higher among people living in rural areas ($\beta=2.14$) and common among women ($\beta=1.15$). Children under five by 48% (APR: 1.48), rural residents by 26% (APR: 1.26), less educated individuals by 34% (APR: 1.34), and those obtaining antibiotics from kiosks by 32 % (APR: 1.32) had a higher chance of unnecessary antibiotic use (Figure 1).

Table 1: Sociodemographic characteristics of study participants, Eastern Ethiopia, 2023.

Characteristics	Categories	N (%) (total =2,256)
Age of respondent (years)	< 20	123 (5.5)
	20-39	1350 (59.8)
	40-59	573 (25.4)
	≥ 60	210 (9.3)
Sex of respondent	Male	366 (16.2)
	Female	1890 (83.8)
Marital status of the respondent	Never married	191 (8.5)
	Married	1803 (79.9)
	Widowed	185 (8.2)
	Divorced/separated	77 (3.4)
Educational level of the respondent	No formal education	1026 (45.5)
	Primary	685 (30.4)
	Secondary	319 (14.1)
	Tertiary	226 (10.0)
Occupation of the respondent	None/student	195 (8.6)
	Farmer	529 (23.5)
	Housewife	1053 (46.7)
	Employed	237 (10.5)
	Merchant	165 (7.3)
	Other*	77 (3.4)
Residence area	Rural	1381 (61.2)
	Urban	875 (38.8)
Household's CBHI membership	Yes	1696 (75.2)
	No	560 (24.8)

Other*: Daily labor, driver, and vocational works, CBHI= community-based health insurance

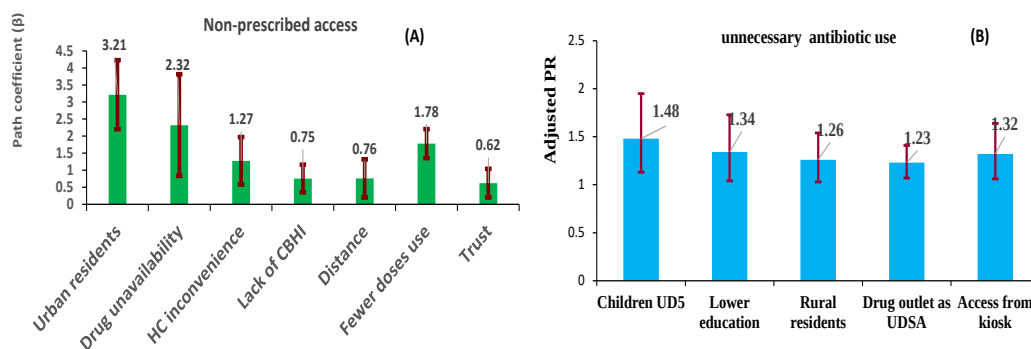


Figure 1: Effects of factors on non-prescribed antibiotic access practices (A) and predictors of unnecessary use practices (B) among study participants, Eastern Ethiopia, 2023.

Policy Recommendations

- Ministry of Health and regional health bureaus should expand antibiotic stewardship efforts to include community-level providers such as drug outlets and primary care clinics.
- Ethiopian Food and Drug Authority (EFDA) and other concerned bodies should strictly enforce prescription-only antibiotic regulations and prohibit unlicensed drug sales, with a focus on rural areas where unauthorized access is prevalent.
- Ministry of Health and the local health authority should deliver tailored educational programs for rural communities, women, mothers of young children, and individuals with limited education to reduce unnecessary antibiotic use.



Improving Contraceptive Use in Resource-Limited Settings: Leveraging Culturally Adoptable Interventions

Tariku Dingeta¹, Galana Mamo¹, Alemyaheu Deressa¹, Mohamed Yuya¹, and Tara Wilfong¹

¹College of Health and Medical Sciences, Haramaya University, Harar, Ethiopia

Key Messages

- Contraceptive utilization increased from 28.9% at baseline to 64.5% after implementing the Cyclic Beads-assisted Standard Day Method (SDM) intervention.
- Male involvement and couple communication improved significantly from 14% to 66.1% after implementing the Cyclic Beads-assisted SDM intervention.
- Women's formal education, positive attitudes toward contraception, high self-efficacy, and active male involvement were the strongest predictors of contraceptive uptake.

Introduction

In low- and middle-income countries, about 12 million girls aged 15–19 and over 777,000 girls under 15 give birth annually, with pregnancy-related complications being the leading cause of death among girls aged 15–19. Contraception is the most effective strategy to reduce unintended pregnancies and improve maternal and child health, offering a range of methods from long-acting devices to fertility awareness-based techniques. Fertility Awareness Methods (FAM), such as the Standard Days Method (SDM), enable women to identify their fertile window

days 8–19 of a typical cycle and avoid pregnancy through abstinence or barrier methods. Tools like Cycle Beads, developed in 2001, help women easily track their fertility signs and improve correct use.

In sub-Saharan Africa, where over half the population is girls, and many marry before 18, early motherhood and unintended pregnancies pose significant health risks, including maternal and infant mortality. Despite this, contraceptive use remains low, particularly in rural areas due to myths, fears of side effects, limited knowledge, and partner disapproval. Community-based promotion of SDM and tools like Cycle Beads has shown promise in increasing demand, improving couple communication, and dispelling myths, although adoption rates are still low among less educated and rural women.

Given these barriers, fertility awareness methods like SDM present a simple, side-effect-free alternative to hormonal or invasive methods. Integrating culturally acceptable, inexpensive tools such as Cycle Beads into community health services led by Health Extension Workers could enhance acceptability and correct use. This approach aims to expand contraceptive options, reduce unintended pregnancies, and ultimately improve maternal and child health outcomes among young women in Ethiopia and similar settings.

Approaches and Results

The study employed a quasi-experimental design to assess the effectiveness of the Cyclic Beads-integrated SDM intervention. It was conducted in Kersa District, Eastern Ethiopia, between January and August 2023. A total of 330 young married women (165 in the intervention group and 165 in the control group) were selected through random sampling from kebeles within the Kersa Demographic Surveillance and Health Research Center. The intervention was delivered by trained Health Extension Workers who provided counseling and education on SDM using Cyclic Beads. The educational sessions emphasized menstrual cycle tracking, identification of fertile days, and strategies for managing fertility, including abstinence or barrier methods during fertile periods. The intervention also incorporated home visits to promote couple communication, address gender norms, and dispel myths about contraception. Health Extension Workers were trained to provide culturally sensitive counseling and to encourage male involvement in contraceptive decision-making. Data were collected at baseline, six months, and twelve months using structured questionnaires, focus group discussions, and in-depth interviews. The intervention led to a substantial increase in contraceptive utilization among participants.

At baseline, only 28.9% of women reported using any contraceptive method. Following the introduction of the Cyclic Beads-assisted SDM, contraceptive use rose to 64.5%, demonstrating the effectiveness of the intervention in addressing barriers to uptake.

The analysis showed that women with formal education were more than three times more likely to use contraception after the intervention (AOR = 3.42). Women with favorable attitudes toward contraception were about five times more likely to use it (AOR = 5.21), and those with high self-efficacy were nearly five times more likely to adopt contraceptive methods (AOR = 4.83). Male involvement emerged as the most significant predictor of contraceptive adoption; specifically, women whose husbands actively participated in decision-making were six times more likely to utilize contraception (AOR = 6.11) (Table 1). Beyond contraceptive uptake, the intervention significantly improved couple communication and male involvement. At baseline, only 14% of women reported active partner support in contraceptive decisions. This figure increased to 66.1% after the intervention. Women with high self-efficacy were nearly six times more likely to report improved communication and male involvement (AOR = 5.87). Awareness of SDM and positive attitudes toward contraception were also associated with better spousal engagement.

Table 1: Predictors of Contraceptive Utilization After Intervention, 2025.

Variables	Category	AOR (95% CI)
Age	15–24 (Reference)	Ref.
	25–35	1.76 (0.73–4.24)
Residence	Rural (Reference)	Ref.
	Urban	1.59 (0.58–4.38)
Religion	Orthodox (Reference)	Ref.
	Muslim	1.82 (0.38–8.71)
Formal education	No (Reference)	Ref.
	Yes	3.42 (1.40–8.37)**
Heard of SDM	No (Reference)	Ref.
	Yes	1.94 (0.82–4.58)
Favorable attitude	No (Reference)	Ref.
	Yes	5.21 (2.01–13.49) *
High self-efficacy	No (Reference)	Ref.
	Yes	4.83 (1.91–12.19) *
Good couple communication	No (Reference)	Ref.
	Yes	2.16 (0.86–5.42)
Male involvement	No (Reference)	Ref.
	Yes	6.11 (2.30–16.21) *

These findings underscore the importance of psychosocial and relational factors in shaping reproductive behaviors. Qualitative data reinforced these quantitative findings, revealing that the intervention helped dispel myths about contraception, reduce fears of side effects, while foster trust between partners. Women reported feeling more confident in negotiating contraceptive use, and men expressed greater willingness to support family planning decisions. The culturally tailored approach, combined with community-based delivery, was instrumental in achieving these outcomes.

The results of this study highlight the potential of fertility awareness-based methods, such as SDM, to address persistent barriers to contraceptive use in resource-limited settings. By integrating Cycle Beads into community health programs and actively involving male partners, the intervention created an enabling environment for informed reproductive decision-making. Education and self-efficacy emerged as critical determinants of success, suggesting that interventions should prioritize building knowledge and confidence among women. Male involvement was particularly influential, reinforcing the need for couple-focused strategies that challenge gender norms and promote shared responsibility for family planning. The findings also have broader implications for reproductive health policy in Ethiopia. Incorporating SDM into the national contraceptive mix could expand options for women who prefer non-hormonal methods, thereby reducing unmet needs and unintended pregnancies. Furthermore, the success of this intervention demonstrates the value of leveraging existing community health structures, such as the Health Extension Program, to deliver low-cost and scalable solutions.

Policy Recommendations

- Ministry of Health and regional health bureaus should scale up culturally acceptable contraceptive education programs like the cyclic bead method, which improve couple communication and also include culturally acceptable family planning methods, such as SDM with Cycle Beads, into the existing Health extension packages.
- Concerned organizations should conduct awareness campaigns to dispel myths and promote side-effect-free contraceptive options such as SDM with Cycle Beads among rural and low-literacy populations.



Bleeding During Pregnancy: The Silent Threat to Mothers and Neonates in Eastern Ethiopia

Haymanot Mezmur¹, Maleda Tefera¹, Adera Debela¹, and Letta Degefa¹

¹College of Health and Medical Sciences, Haramaya University, Harar, Ethiopia

Key Messages

- About 8 out of every 100 pregnancies in Eastern Ethiopia had serious bleeding before birth, mostly caused by the placenta detaching prematurely from the uterus (50.7%) and the placenta is near or covers the cervical opening (44.9).
- Bleeding during pregnancy often led to serious problems like babies being born too early (43.5%), low birth weight (26.1%), mothers needing cesarean surgery (55.1%), and mothers developing anemia (42%).
- Bleeding during pregnancy was higher among women who had many previous pregnancies, past cesarean section, short gaps between pregnancies (<24 months), and chewed khat during pregnancy.

Introduction

Bleeding during pregnancy, such as antepartum and postpartum hemorrhage, is one of the main contributors to maternal and neonatal mortality in Ethiopia, contributing to high mortality in the country. Hemorrhage is responsible for a high percentage of maternal mortality, which is fueled by the limited availability of timely and quality obstetric care. Neonatal mortality is also affected since severe maternal hemorrhage is highly related to preterm delivery, underweight at birth, and asphyxia, which account for most causes of neonatal death. Despite intervention to boost maternal health services, the incidence of preventable pregnancy bleeding-related death emphasizes the need for increased antenatal care, emergency obstetric care, and knowledge at community levels to effectively tackle this serious problem.

This study aims to assess the magnitude, associated factors, and feto- maternal outcomes of antepartum hemorrhage (APH) in Eastern Ethiopia, addressing critical gaps in knowledge and informing evidence-based interventions to improve maternal and neonatal health.

Approaches and Results

A prospective, institutional follow-up study was conducted across four public hospitals in Harari Region and the Dire Dawa City Administration from April to June 2023. A total of 882 women who gave birth were enrolled using systematic random sampling proportional to facility case loads. Data were collected via face-to-face interviews and clinical record reviews using a structured questionnaire. The overall prevalence of bleeding during pregnancy was 7.8 %. Among these cases, Placental abruption (placenta detaches prematurely from the uterus) was the leading cause, accounting for 50.7 %, followed by Placenta previa (placenta is near or covers the cervical opening) at 44.9 %, while 4.4 % were of unknown origin (Figure 1).

Analysis of associated factors revealed that grand multigravida women (5 or more previous pregnancies) were nearly five times more likely to experience bleeding during pregnancy compared to primigravida women (AOR = 4.91). Similarly, women with a history of cesarean section had more than four times the odds of APH compared to those without such a history (AOR = 4.45). Short inter-pregnancy intervals of less than 24 months were strongly associated with bleeding during pregnancy, increasing the likelihood by over five times (AOR = 5.30).

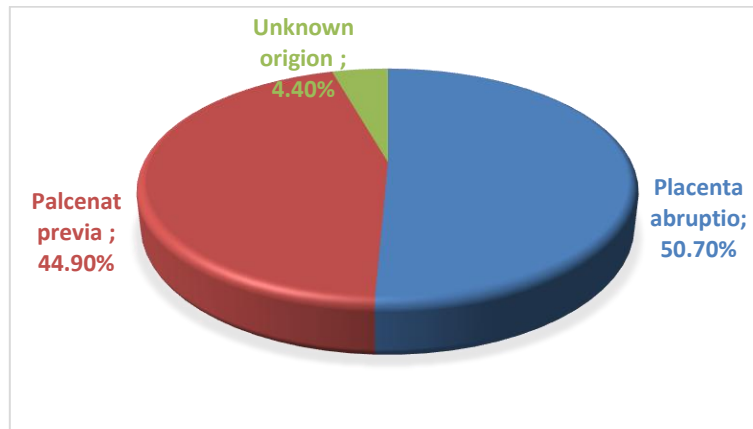


Figure 1. Causes of bleeding during pregnancy among study participants

Khat chewing during pregnancy was linked to more than twofold increase in risk of bleeding during pregnancy (AOR = 2.39).

The maternal and neonatal outcomes among women with bleeding during pregnancy were severe. More than half of the affected women (55.1%) required cesarean delivery, and 42 % developed anemia. Neonatal complications were also significant, with 43.5 % of babies born preterm and 26.1 % classified as low birth weight. These findings underscore the clinical and public health importance of bleeding during pregnancy and its strong association with preventable risk factors.

The 8% bleeding during pregnancy prevalence across four public hospitals indicates a meaningful public health challenge in Eastern Ethiopia. The predominance of abruptio placentae and placenta previa mirrors global patterns, yet the magnitude and distribution highlight gaps in risk screening, Antenatal care continuity, and referral readiness. The strong associations with grand multigravidity, prior cesarean section, and short spacing illuminate actionable windows for prevention through postpartum family planning, post- cesarean section risk counseling, and birth spacing services integrated into antenatal care and postnatal care.

Policy Recommendations

- Ministry of Health and regional health bureaus should strengthen antenatal care programs by integrating bleeding during pregnancy risk screening and ensuring timely referral and emergency obstetric care readiness.
- Ministry of Health and regional health bureaus should provide competency-based training for health workers on bleeding during pregnancy risk assessment, stabilization protocols, and management of complications.
- Stakeholders and partners should support community-based interventions that promote birth spacing and awareness of APH risk factors, including behavioral change strategies for khat cessation.
- Ministry of Health and regional health bureaus should prioritize monitoring and evaluation systems to track bleeding during pregnancy cases, referral efficiency, and maternal and neonatal outcomes for continuous improvement.



Eco-Friendly and Low-Cost Construction Materials for Sustainable Rural Housing

Hamza Ahmednur¹, Bedaso Ahmed¹, Belete Tefera, Zekreab Nega¹, Tamirat Kebede¹, and Dawit Abate¹

¹Department of Civil Engineering, Haramaya University, Haramaya, Ethiopia

Key Messages

- Bate soil met the required 70–90% reactive aluminosilicate range, confirming its suitability for geopolymer production.
- Optimized Bate-based geopolymer blocks achieved 4.0 MPa average strength, comparable to cement-stabilized blocks.
- Ambient-cured geopolymer blocks achieved 3.4 MPa strength, showing feasibility for low-cost rural housing.

Introduction

Green construction technology is an emerging, innovative approach that supports the construction industry while promoting environmental sustainability. It focuses on developing sustainable, low-cost, and eco-friendly building materials by utilizing locally available earth resources and industrial byproducts. The construction sector, one of the largest globally, plays a crucial role in economic development, but it also contributes significantly to environmental pollution. Worldwide, the construction sector is the fifth-largest source of man-made CO₂ emissions, following energy, transportation, industry, and land-cover changes such as deforestation. It consumes nearly 40% of global energy and is responsible for approximately 33% of global CO₂ emissions. A major contributor is the Portland cement manufacturing process, which releases approximately 0.9 tons of CO₂ per ton of clinker

produced and accounts for about 2.8 billion tons of CO₂ emissions annually, contributing 5–8% of global emissions. Although Portland cement provides strong engineering performance, it is not environmentally sustainable. Therefore, developing low-carbon, geopolymer-based alternatives from locally available materials is essential. Such innovations are vital for addressing Ethiopia's rural housing challenges, improving the living standards of the 80% rural population, and contributing meaningfully to global climate-action efforts.

Approaches and Results

The research evaluated the potential of two soils: Bate soil (Haramaya) and Guguba soil as primary precursors for geopolymerization, supplemented by Khat ash and Sugarcane Bagasse ash. The materials' physical, chemical, and mineralogical analyses were conducted using standard methods and instruments. A combination of Sodium Hydroxide (NaOH) and Sodium Silicate (Na₂SiO₃) was used as the alkaline activator. The prepared Geo-polymer compressed earth block (GPCEB) was tested for compressive strength under different curing conditions: oven-curing (80°C for 48 hours + 14 days at room temperature) and ambient-curing (25.5°C ± 2 for 60 days). Compressive strength tests were performed on all samples, and the findings were compared with Portland-cement-stabilized compressed earth blocks (CSCEBs) to assess the performance and suitability of these eco-friendly alternatives.

Bate soil was identified as silica-alumina rich (well-graded sand), while Guguba soil was found to be silica-poor. Bate soil contains the necessary oxides (SiO_2 , Al_2O_3 , Fe_2O_3) that mimic the functional chemistry of cement when activated. Khat ash was found to be high in Lime (CaO), acting as a natural stabilizer.

Bate-based GPCEBs with 15 M NaOH, a 3.5 $\text{Na}_2\text{SiO}_3/\text{NaOH}$ ratio, and 17.20% alkaline solution achieved optimum strengths of 4.88 MPa (max) and 4.00 MPa (avg) after 14-day oven curing. Under ambient curing conditions, the same formulation reached 3.71 MPa (max) and 3.40 MPa (avg) at 60 days. This exceeds the strength of many traditional handmade bricks and meets load-bearing standards. The study proved that ambient curing (natural air drying) produces sufficient strength for single-story dwellings, eliminating the need for energy-intensive industrial kilns.

Blended Bate–Guguba samples recorded 4.2 MPa (max) and 3.50 MPa (avg) at 14 days. The Guguba-based GPCEBs produced lower results

(0.91 MPa) below acceptable strength due to low silica content, indicating that soil selection or blending is critical to achieve the required load-bearing capacity. The results show that Bate soil possesses the chemical and physical characteristics required for geopolymer formation and consistently produces GPCEBs that meet the standard strength requirements for load-bearing applications.

The high silica and alumina contents, low fines, and non-plastic behavior contribute to strong geopolymer bonding, while the optimized activator ratios significantly improved compressive strength under both oven and ambient curing temperatures. In contrast, Guguba soil's low silica content limits its reactivity, explaining its poor performance unless blended with Bate soil. The strength performance of the best Bate-based GPCEBs is comparable to that of conventional cement-stabilized blocks, demonstrating the feasibility of adopting geopolymer alternatives in low-cost sustainable construction. Bate soil is a highly suitable local source material for geopolymer compressed earth blocks, offering a low-carbon and structurally reliable alternative to cement-based materials.

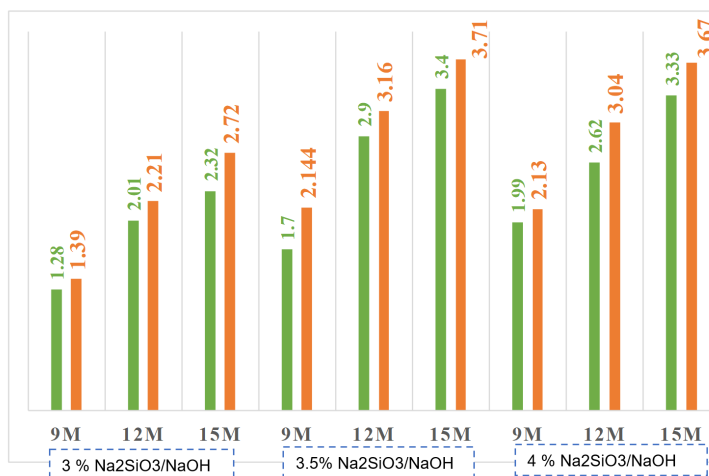


Figure 1: Max. and Av. compressive strength of Bate soil GPCEB samples at ambient curing temperature for 60 days.

Policy Recommendations

- Ministry of Urban and Infrastructure should integrate sustainable and geopolymer-based materials into national building guidelines and encourage their use in affordable housing projects.
- Regional governments should support pilot housing projects using GPCEBs to demonstrate performance and encourage local adoption.
- Ministry of Urban and Infrastructure and other stakeholders should provide technical training and support to small and medium enterprises and local producers to scale up production of eco-friendly construction materials.



HARAMAYA UNIVERSITY

OFFICE OF RESEARCH AFFAIRS

POLICY BRIEF 4.1
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THEME

IV

Work and Life-Cycle Oral Traditions for Social Cohesion and Local Development in East Hararghe

Abera Admasu¹, Jeylan Woliye¹, Mohammed Hassen², and Mohammed Abdo³

¹School of Foreign Languages and Journalism, Haramaya University;

²School of History and Heritage Management, Haramaya University;

³Department of Afaan Oromoo, Literature and Communication, Haramaya University

Key Messages

- Work songs and Mirriysaa are productive civic tools which coordinate labor, transmit thrift and post-harvest norms, and provide a safe forum for voicing grievance and ethical counsel.
- Marriage and praise genres socialize youth into responsibility and mutual respect, offering culturally legitimate advice during life-cycle transitions.
- Women's repertoires (hindikkoo, lullabies) preserve voice and agency; their decline with mechanization/mobility erodes intergenerational knowledge and psychosocial support.

Introduction

Oral traditions across Africa have long served as central institutions for transmitting knowledge, reinforcing social values, and sustaining communal life. Among the Oromo of East Hararghe, these traditions remain especially vibrant, functioning not only as artistic expressions but also as practical systems that guide behavior, strengthen cooperation, and preserve collective memory. Genres such as mirriysaa, darashaa, shobdo, hindikkoo, shaggooyyee, heellee/heellemaa, and various praise songs operate as culturally grounded mechanisms through which communities organize labor, train youth, articulate social expectations, and manage emotional and civic expression.

Today, however, rapid socioeconomic and cultural changes manifested by urbanization, declining communal labor, expanded media influence, and shifting religious or administrative attitudes are shrinking the spaces where these oral forms traditionally flourish. As these pressures intensify, intergenerational transmission weakens and women's expressive platforms, in particular, diminish. Revitalizing these repertoires within schools, youth centers, community gatherings, and local media offers a low-cost, culturally resonant strategy to rebuild social cohesion, enrich development initiatives, and preserve the living heritage that has long anchored community resilience in East Hararghe.

Approaches and Results

This study employed long-form ethnographic methods, including interpretive interviewing, focus group discussions, and participant observation across several districts of East Hararghe. Oral texts were collected, transcribed, and analysed using ethnopoetic and interpretive frameworks, allowing researchers to link performance, content, and social context. The study engaged elders, women, youth, religious leaders, poets, and cultural practitioners, enabling a holistic exploration of how oral traditions function in everyday life, how they adapt to changing realities, and how communities use them to address contemporary social, economic, and moral challenges.

Mirriysaa is a vernacular forum for civic critique, memory, and ethics. Mirriysa is performed publicly and opened by a call to “deep listening” (guurii gurraa fudhadhu). Mirriysa surfaces injustice, leadership failure, and shared hardship while modeling respectful deliberation. Verses recall historic trauma (e.g., Chalenko), connect it to present governance dilemmas, and end with an invitation:

Example of Mirriysaa's call to attentive listening & memory.

Dhagahii dhaggeeffadhuu... guurii gurraa fudhadhuu

Yaaboo lola gaafa Calanqoo himadhu moo nin dhiisaa?

Listen with understanding... remove the wax from your ears...

Shall I speak of the battle of Chalenko or be silent?”

Message: Re-opening painful memory to teach vigilance and shared responsibility; creating a safe call-and-response forum for civic learning. This dialogic structure trains communities in accountability and empathy without confrontation.

Cultural work songs coordinate labor and encode productivity, thrift, and fairness.

Darashaa synchronizes group effort during guuza (a system where a large number of people work in an individual's farm as a form of support), motivates timely fieldwork, and transmits norms: avoid waste, manage time, save grain, treat workers fairly, and reward effort. Shobdo adds drum-like rhythm during threshing to sustain tempo and morale; in earlier landlord–tenant settings, it doubled as a discreet protest against exploitation. These songs thus serve as “soft regulation,” guiding work behavior and expectations.

Example: Darashaa — post-harvest care and thrift.

Haati dhiiraa ni beeytii; firii buute ni fuutii

A mother of sons knows; she picks up grains that fell.

Message: Norm against waste; promote household food security through careful handling of harvest.

Example: (Shobdo — energizing and subtle protest):

Haromaayaan leenci bulee; ohoo hayee... Barre laashaa akka sootii...

The lion slept at Haramayaa... Learn to rule smoothly...”

Message: Keep rhythm at work while voicing a gentle critique of unjust rule, moral suasion embedded in labor.

Hindikoo preserves women's public voice; its decline shrinks psychosocial support.

Hindikoo was sung mainly during grinding, it is a confiding, candid space where women air burden, counsel peers, and set relational boundaries. With the spread of mills and the erosion of evening grinding circles, women lose an everyday performance venue, reducing social support and the transmission of home economy knowledge.

Sihi, mooyyeen maal si seete... Haftuu ulfoofte si seete...

Hey you! The mortar underestimates you... It mistook you for an ‘unmarried but pregnant’ woman.

Message: Playful sting to push diligence and discourage risky behavior; peer regulation through song.

Marriage and youth genres socialize, advise, and dignify transitions. **Shaggooyyee** celebrates youth, selection, and play; heellee/heellemaa provides practical counsel to brides, stressing communication, restraint, and dignity with in-laws and spouses. Their decline (due to modern media, earlier administrative discouragement, and stricter readings of permissibility) removes a culturally legitimate pedagogy of adulthood.

Example 1: Shaggooyyee - esteem & longing
Urjiin samii tanaa lakkoofsattuu kumaa... Eessaa asiin baatee takkiittii akka kumaa...

The stars are a thousand; where did you come from, you who are like a thousand?

Message: Positive appraisal and selection; builds esteem and mutual respect among youth.

Example 2: Heellee - counsel to the bride
Ayiyoon amba arrabde jette bafte sihimtii gargari galla...

Use butter carefully; your mother-in-law may blame you for finishing it soon.

Message: Practical household prudence and respectful relations; a gentle code of conduct in marriage.

Praise genres reinforce agrarian identity and emotional literacy. Lullabies let mothers' express fears and negotiate power at home; cattle praise songs motivate animal care and honor the household economy. The genres nudge good husbandry, gratitude, and interdependence between people, land, and herds.

Policy Recommendations

- Ministry of Education and Oromia Education Bureau should embed indigenous lyrics like mirriysaa, darashaa/shobdo, hindikkoo, shaggooyee, and heellee into school clubs, co-curricular programs, and arts/literature periods, ensuring structured cultural learning opportunities.
- Ministry of Women and Social Affairs should fund and facilitate women-led circles like Hindikkoo circles as safe community spaces while also promoting intergenerational programs that revive women's oral repertoires and strengthen their cultural agency.
- Ministry of Culture and Sports and Oromia Culture and Tourism Bureau should record and archive community repertoires with fair IP protection, restore seasonal guuza and post-harvest festivals as cultural stages, and produce radio mini-series on oral traditions with broadcasters.
- Woreda and Kebele administrations should support community cultural events, provide spaces for hindikkoo circles, and ensure ethical documentation with elders.
- Universities should support documentation of oral traditions and train educators and cultural workers in heritage preservation.



Multicultural Curriculum Implementation Gaps: Evidence from Eastern Ethiopia's Public Universities

Debela Tezera¹, Yilfashewa Seyoum¹, Dawit Negassa¹, and Garkebo Basha¹

¹College of Education and Behavioral Sciences, Haramaya University, Ethiopia

Key Messages

- Multicultural curriculum implementation in Eastern Ethiopian public universities is low overall, indicating weak practice across most dimensions of classroom multicultural engagement
- Academic staff show low commitment to implementing multicultural curriculum and instructor commitment remains insufficient to support meaningful multicultural curriculum execution.
- Barriers include low awareness, limited guidance and instructional materials, scarcity of multicultural education experts, and weak leadership attention, all of which hinder the promotion of diversity and inclusive curriculum practices in public universities.

Introduction

Climate Higher Education Institutions (HEIs) across the world are increasingly required to respond to expanding cultural, linguistic, ethnic, and ideological diversity. In this context, multicultural education (MCE) has emerged as a vital approach for promoting equity, tolerance, coexistence, and social cohesion within diverse learning environments. Education is fundamentally a tool for societal transformation, and curriculum lies at the center of this process,

acting as the “heart of education,” guiding teaching, learning, assessment, and socialization in ways that shape the attitudes, competencies, and identities of students. As global educational systems confront challenges related to diversity, MCE has been continuously re-conceptualized in theory and practice and remains a major arena of debate regarding human rights, social justice, and effective curriculum implementation in multicultural societies.

Ethiopia, a nation characterized by deep cultural, linguistic, and ethnic diversity, has long recognized the need for multicultural curriculum reform. Recent national policies, including the Education Roadmap (2018) and Higher Education Strategies, emphasize unity in diversity, equitable access, fairness, relevance, and quality. Yet, despite these commitments, Ethiopian public universities continue to experience ethnic tensions, political polarization, and widening gaps between curriculum policy and classroom practice. Research consistently shows that academic staff often lack awareness, skills, and pedagogical preparation to implement multicultural perspectives effectively, resulting in limited curriculum integration, insufficient multicultural programs, and low levels of instructional responsiveness. These challenges underscore the urgency of assessing academic staff commitment, identifying structural barriers, and strengthening the prospects for implementing multicultural curriculum in Ethiopian public universities.

Approaches and Results

The study employed a cross-sectional descriptive survey design, relying primarily on quantitative data collected through a self-administered questionnaire distributed to 151 academic staff members across Eastern Ethiopian public universities. Sampling procedures included stratified sampling and simple random selection to ensure representative participation. Instrument reliability was checked using Cronbach's alpha following a pilot test. Data analysis used descriptive statistics (mean, SD) and inferential techniques including t-tests and one-way ANOVA to examine the status of multicultural curriculum implementation, academic staff commitment, and potential gender differences.

The study found that the overall status of multicultural curriculum implementation in Eastern Ethiopian public universities is low, with an overall mean score of $M = 2.097/5$, $SD = 1.09$ across key indicators, highlighting insufficient integration of multicultural perspectives in classroom practice. Items measuring critical competencies such as managing multicultural classroom challenges, creating tolerance for cultural differences, integrating global issues into instruction, and applying culturally responsive pedagogy recorded some of the

lowest mean values, indicating that these essential multicultural practices receive limited emphasis from both academic staff and university leadership. In contrast, practices such as adapting instruction to diverse students, reducing ethnic stereotyping, using role-play to reflect diversity, organizing multicultural events, and promoting teamwork for tolerance showed moderate implementation, though not strong enough to indicate meaningful institutionalization. These patterns collectively show that while some multicultural elements are present, they lack consistency, depth, and systematic application across universities.

Regarding academic staff engagement, the results demonstrate that commitment to multicultural curriculum implementation remains low. Although the observed overall mean score ($M = 23.81$) is close to the expected midpoint ($M = 24$), t-test results show that staff commitment is not adequate to ensure successful implementation. The findings reveal that while instructors may express positive attitudes toward multicultural education in theory, many still lack the practical skills, pedagogical preparation, content knowledge, and motivation needed to effectively integrate multicultural perspectives into their teaching. This gap between belief and practice underscores a substantial need for targeted professional development and institutional support. The study further investigated whether demographic factors, particularly gender, influence multicultural curriculum implementation.

Table 1: Status of multicultural curriculum implementation in eastern Ethiopian public universities.

Practice Indicator	N	Mean (M)	SD	Interpretation
Handle multicultural classroom challenges	151	2.94	1.034	Moderate
Adapt teaching to student diversity	151	3.11	1.006	Moderate
Create tolerance for cultural differences	151	2.92	0.97	Low
Reduce ethnic stereotyping	151	3.2	1.02	Moderate
Encourage expression of diverse identities	151	3.92	1.03	Moderate
Use role-play to reflect diversity	151	3.06	1.02	Moderate
Integrate global issues into curriculum	151	2.22	1.091	Low
Organize multicultural events	151	3.03	0.99	Moderate
Apply culturally responsive pedagogy	151	2.12	1.06	Low
Create teamwork for tolerance	151	3.18	1.02	Moderate

A one-way ANOVA showed no statistically significant difference between male and female academic staff in their levels of implementation ($F(22,128)=0.879$, $p=.621$), suggesting that both groups experience similar constraints and challenges. This finding indicates that the barriers affecting implementation are not related to gender but rather stem from broader systemic issues across the institutions. In addition to these quantitative findings, the study identified several major barriers hindering effective multicultural curriculum implementation. These include insufficient multicultural programs and courses, limited awareness, low appreciation for multicultural activities, scarcity of experts in multicultural education, and lack of essential instructional materials. Leadership commitment was also found to be weak, with university administrators giving inadequate attention to strengthening multicultural practices. The politicization of multiculturalism, driven by fears of ethnic division and misinterpretations related to ethnic federalism, further complicates efforts to introduce diversity-affirming curricula. These institutional and contextual challenges collectively point to the structural nature of the problem and highlight the urgent need for coordinated interventions across leadership, staff development, and curriculum design.

Policy Recommendations

- Higher Education Institutions should recognize their responsibility to produce citizens capable of addressing cultural diversity in the academic and extracurricular platforms and contributing to national and global development.
- The Ministry of Education should pay due attention to designing, developing, and evaluating higher education curricula and strategies, providing training and essential packages that ensure whether multicultural and diversity issues are fully implemented and monitored in Ethiopian Public Universities.
- The Ministry of Education should pay due attention to designing, developing, and evaluating higher education curricula and strategies, providing training and essential packages that ensure multicultural and diversity issues are fully implemented and monitored in Ethiopian Public Universities.
- The Ministry of Education should prioritize improving multicultural program design and providing culturally relevant teaching materials; national multicultural education frameworks should be established to guide program development, and universities should collaborate to share resources for effective multicultural education implementation.
- The Ministry of Education, together with university leadership, should prepare comprehensive guidelines for academic leaders, staff, students, and stakeholders to promote the values and importance of multicultural education in higher-education institutions
- The Ministry of Culture and Sports, should coordinate efforts of different stakeholders, provide guidance, and avail material and financial supports to enhance multiculturalism in school set ups and non-school environments.



Enhancing Welfare and Resilience through Bundled Climate-Smart Practices: Insights from East Hararghe, Ethiopia

Jafer Mume Ahmed¹, Jema Haji², Moti Jaleta³, and Kedir Jemal²

¹Africa Center of Excellence for Climate-Smart-Agriculture and Biodiversity Conservation, Haramaya University, Ethiopia;

²School of Agricultural Economics and Agribusiness, Haramaya University, Haramaya, Ethiopia;

³International Maize and Wheat Improvement Center, Addis Ababa, Ethiopia

Key Messages

- Households adopting Climate-Smart Agricultural Practices, such as conservation agriculture, soil fertility management, and crop diversification, achieved up to 73% higher consumption expenditure than non-adopters.
- Integrated Soil Fertility Management improved dietary diversity by 43.7%, and manure combined with chemical fertilizer raised households' annual income by ETB 41,938.
- Education, extension support, livestock ownership, and access to climate information are major drivers of adoption, while distance from markets remains a significant barrier.

Introduction

Climate change significantly affects global agricultural productivity and represents one of the most critical challenges to food systems worldwide. Climate shocks such as drought severely reduce crop yields and household income, leading to food insecurity and welfare losses. Agricultural productivity in sub-Saharan Africa remains below global averages due to high vulnerability to climate extremes and dependence on rain-fed farming. The climate shocks, often expressed as deviations from long-term rainfall norms, have become increasingly frequent and severe in Ethiopia.

These have worsened food insecurity, reduced access to water, and diminished agricultural production, further aggravated by traditional agronomic practices. Consequently, household consumption expenditure becomes highly sensitive to rainfall variability, underscoring the urgent need for adaptive strategies. In the country, recurring droughts have affected millions, including over 7.5 million people in Oromia. In drought-prone areas of East Hararghe, recurrent moisture stress has eroded household resilience and deepened poverty traps.

Climate-Smart Agricultural Practices (CSAPs) such as conservation agriculture, integrated soil fertility management, and crop diversification offer a promising pathway to enhance resilience, increase productivity, and reduce poverty. Empirical evidence shows that CSAP adoption improves household food consumption, dietary diversity, and income while mitigating climate risks. However, adoption remains low in Ethiopia, particularly in drought-prone zones like East Hararghe. This study addresses two key questions: (1) What factors influence farmers' adoption of CSAPs? (2) Does adopting CSAPs improve household welfare under drought conditions? The central hypothesis is that CSAP adoption increases household consumption expenditure by reducing climate-related losses.

Approaches and Results

The study was conducted in Goro-Gutu, Gursum, Babile, and Kersa districts of East Hararghe Zone. Data were gathered from 430 farm households through surveys, supported by 30 years of rainfall records to confirm increasing drought. The practices assessed included Conservation Agriculture, which encompasses intercropping, crop rotation, and mulching; Integrated Soil Fertility Management, involving manure application, fertilizer use, and erosion control; and Crop Diversification through the cultivation of multiple high-value and/or drought-tolerant crops. Household welfare was measured using indicators such as consumption expenditure per adult equivalent, dietary diversity, and farm income. Poverty was evaluated against Ethiopia's official poverty line, while resilience was assessed using a composite score that reflects households' coping capacity during drought years. A resilience score was developed to understand how farmers cope during drought years. Different econometric models were used to assess the determinants and impacts of CSAPs adoption.

Rainfall records and farmer reports confirm that droughts have become more frequent and severe, signaling growing climate stress in the study area. Adoption of climate-smart practices was strongly linked to education, extension services, timely climate information, and livestock ownership, while long market distances and input shortages remained major barriers. Conservation agriculture increased annual consumption by 36.3%, and combining multiple practices boosted this gain to 73.3%, significantly reducing poverty (Table 1). Integrated Soil Fertility Management (ISFM) improved dietary diversity by 43.7%, and manure combined with chemical fertilizer raised income by ETB 41,938. Households allocating at least 40% of farmland to diversified crops showed greater resilience to drought, with the highest scores among those adopting bundled practices. Overall, integrated adoption consistently outperformed single-practice adoption, delivering stronger and more stable welfare and resilience benefits.

Table 1: The impact of adopting different CSAPs on Poverty and Welfare.

Outcome Variable	CSAP Packages	Farmer's Decision		
		To adopt	Not to Adopt	Treatment Effect
		Actual	Counterfactual	ATT
Households' Dietary Diversity Score	C ₁ E ₀ F ₀	6.208	4.511	1.696***
	C ₀ E ₁ F ₀	5.652	3.181	2.471***
	C ₀ E ₀ F ₁	5.706	5.403	0.303
	C ₁ E ₁ F ₀	6.229	5.860	0.369***
	C ₁ E ₀ F ₁	4.333	2.729	1.604***
	C ₀ E ₁ F ₁	4.571	3.581	0.989***
	C ₁ E ₁ F ₁	6.047	5.529	0.517***
Income	C ₁ E ₀ F ₀	32021.67	6987.05	25034.61***
	C ₀ E ₁ F ₀	31033.91	24360.08	6673.83***
	C ₀ E ₀ F ₁	7347.06	15637.69	11709.37
	C ₁ E ₁ F ₀	29603.64	19583.34	10020.3***
	C ₁ E ₀ F ₁	41938.1	21805.1	20133***
	C ₀ E ₁ F ₁	31941.43	6717.17	25224.26***
	C ₁ E ₁ F ₁	34508.98	7714.87	16794.11***
Consumption Expenditure Per Adult	L ₁ R ₀ M ₀	8472.77	7647.52	825.25**
	L ₀ R ₁ M ₀	10506.05	10289.19	216.86
	L ₀ R ₀ M ₁	13743.27	5550.57	8192.69***
	L ₁ R ₁ M ₀	9014.54	.10 (309	1297.43***
	L ₁ R ₀ M ₁	9525.36	5591.76	3933.60***
			(373.49)	
	L ₀ R ₁ M ₁	11524.72	8592.27	2932.44***
			(466.28)	
	L ₁ R ₁ M ₁	14659.94	3911.73	10748.21***
			(927.65)	

Note: Compost(C), Erosion cor(E), Fertilizer(F), Intercrop (L), Rotation(R), Mulching(M)

Policy Recommendations

- Ministry of Agriculture and regional bureaus should promote bundled climate-smart agricultural practices combining conservation agriculture, soil fertility management, and crop diversification to maximize welfare and resilience benefits.
- Ministry of Agriculture, Ethiopian Meteorological Institute, and other concerned stakeholders should support the adoption of climate-smart agricultural initiatives through providing locally tailored climate information and early warnings using SMS, radio, and farmer networks.
- Federal and regional seed enterprises, cooperative unions, and others relevant organizations should facilitate access to certified drought-tolerant seeds and essential inputs, enabling farmers to diversify crops.
- Agricultural extension workers should deliver competency-based training for development agents on CSAP implementation, climate risk management, and farmer advisory services.



Geophysical Evidence for Updating National Construction Guidelines in Seismically Active Campuses: Insights from Haramaya University

Bekelu Abeba Mamo¹, Gelana Amente Raba¹, and Hana Teshome Bobaso¹

¹Department of Physics, College of Natural and Computational Sciences, Haramaya University, Ethiopia

Key Messages

- Geophysical surveys identified hidden active fault zones beneath Haramaya University's main campus.
- Several structurally weak zones dominated by low-resistivity sedimentary layers and fractures were detected, which may amplify even small-magnitude earthquakes.
- Geophysical surveys detected shallow fractures and weak zones in the central (Profile 3) and southeastern zone (Profile 4) of Haramaya University's campus, these areas require careful engineering assessment and adherence to earthquake resistant construction standards
- Magnetic anomaly maps, pseudo-depth sections, and 2D modeling consistently confirm weak subsurface zones and potential fault lines, indicating areas of elevated seismic vulnerability.

Introduction

Earthquakes pose severe risks to life and infrastructure, particularly in geologically active regions such as the Main Ethiopian Rift. Eastern Ethiopia including the Haramaya–Dire Dawa corridor has recorded multiple recent earthquakes, such as the 3.0 Mw event north of Haramaya University (2021), the 4.5 Mw earthquake between Dire Dawa and Haramaya, and the 4.3 Mw event near Shinile.

Earthquake impacts are heavily influenced by These incidents underscore the region's vulnerability and the need for proactive seismic risk assessment subsurface geology, fault structures, and the mechanical properties of soil and rock layers; even small events may be amplified in areas characterized by sedimentary formations, fractures, and weak zones. As cities and university campuses expand, recognizing fault structures and unstable subsurface conditions becomes more critical for the planning and building of safe and resilient infrastructure.

Haramaya University has experienced significant infrastructure expansion over recent years, yet no systematic geophysical assessment of subsurface fault structures had been conducted prior to this study. Buildings such as classrooms, dormitories, and laboratories were sited based largely on surface-level geotechnical observations without subsurface fault mapping. This omission increases the potential risk of constructing on or near active faults or weak geological regions. The present study addresses this critical gap by applying combined electrical resistivity and magnetic methods recognized globally for detecting shallow subsurface structures, lithological variations, and hidden faults. The study aims to identify active fault traces, weak zones, and rock types beneath the Haramaya University campus and to provide evidence-based guidance for safe future construction and campus planning.

Approaches and Results

The study deployed nine Vertical Electrical Soundings (VES) and 398 magnetic survey points across four geophysical profiles using a PASI 16 GL Earth Resistivity Meter and GSM-19T Proton Magnetometer. VES data were processed using WinResist software to obtain layered resistivity and thickness, while magnetic data were corrected for diurnal variations and modeled using Geosoft Oasis Montaj. AutoCAD and Surfer software were used to integrate resistivity sections, pseudo-depth maps, and magnetic anomaly maps to identify weak zones, lithological boundaries, and probable fault structures. Borehole logs were used to constrain geoelectrical interpretations. The integrated geophysical investigations reveal that Haramaya University's subsurface contains multiple weak zones and potential active faults, primarily associated with low-resistivity sedimentary layers, clay-rich horizons, fractured rocks, and disrupted lithological contacts. These zones are distributed across several profiles, with Profiles 3 (the central campus zone) and 4 (the southeastern campus zone) showing the strongest evidence of geologically into consider during building the construction. Evidence from Electrical Resistivity Profiles VES data across Profile 3 (Figure 1) show three major subsurface layers: a variably fractured marlstone top layer, a thick clay-rich second layer with very low resistivity (2–22 Ωm), and deeper

transitions into dolomite, basalt, and marble. The low resistivity and variable moisture content indicate fractured and water-saturated materials associated with structural weakness. The pseudo-depth resistivity map confirms extensive zones with resistivity < 70 Ωm , characteristic of sedimentary or weathered materials likely to amplify ground motion. Areas between VES-3 and VES-4 contain multiple shallow weak zones, suggesting that even minor seismic waves could be intensified. The low resistivity and variable moisture content indicate fractured and water-saturated materials associated with structural weakness. The pseudo-depth resistivity map confirms extensive zones with resistivity < 70 Ωm , characteristic of sedimentary or weathered materials likely to amplify ground motion. Areas between VES-3 and VES-4 contain multiple shallow weak zones, suggesting that even minor seismic waves could be intensified. Profile 4 exhibits even clearer manifestations of unstable geological conditions (Figure 1). The surface layer is exceptionally thin (3 m), reflecting shallow weathering, and the third layer shows heterogeneous rock types including dolomite, slate, fractured gabbro, and weathered quartzite. The presence of highly fractured gabbro a mechanically weak material within the third layer signals a significant weak zone extending from shallow levels downward. Pseudo-depth maps in Profile 4 similarly reveal expansive low-resistivity zones (mostly < 60 Ωm), indicating porous, moist, or clay-rich sediments, which are well-known for amplifying seismic motion.

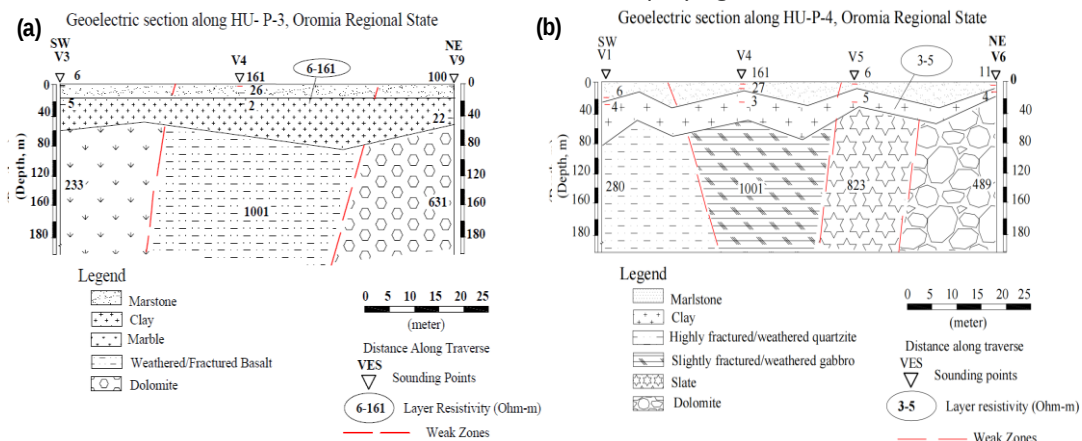


Figure 1: Geoelectric section for (a) Profile-3 (Central zone), (b) Profile-4 (the southeastern campus zone).

Magnetic anomaly map (Figure 1a) further validates the electrical findings. Residual anomaly maps show widespread low magnetic susceptibility zones, reflecting weathered or sedimentary rocks. Areas with slightly higher anomalies correspond to magnetic amplification from pedogenic processes or subsurface igneous intrusions; these anomalies map lithological contacts and potential fault traces. Analytical Signal (Figure 2d) and Tilt Derivative (Figure 2b) maps highlight fault-like lineaments, many trending NW–SE, indicating the presence of structural discontinuities beneath the campus. These discontinuities appear as boundaries between low-magnetic and high-magnetic lithologies. The Tilt Derivative map identifies these contacts at various depths, while Euler Deconvolution resolves fault-related weak zones at depths of 138–203 m, further confirming the presence of subsurface instability. The combined evidence suggests that several locations across Haramaya University lie atop zones that could significantly magnify the effects of small earthquakes, especially where clay layers, sedimentary rock, fractured gabbro, and marlstone coincide. Such geological configurations are well-known to pose higher seismic risk due to their low shear strength and tendency to deform. As a result, any new building in these locations should be preceded by extensive geotechnical research, and

existing structures near the identified weak zones should be reviewed to determine their seismic susceptibility.

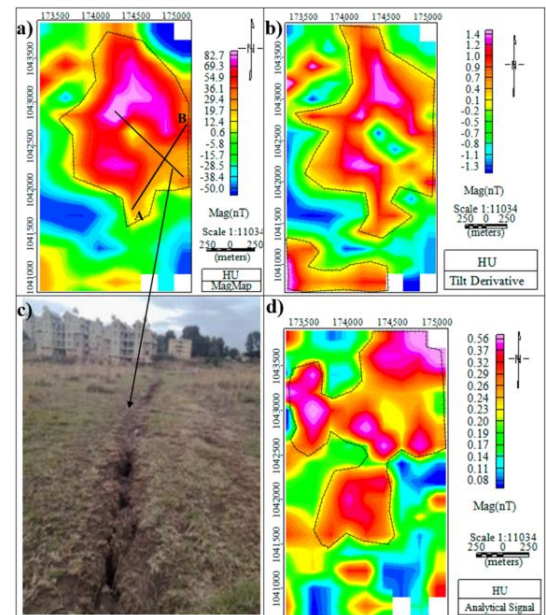


Figure 2: a) Residual magnetic map, b) Tilt Derivative map, c) NW-SE presence of feature direction in study area, and d) Analytical signal map

Policy Recommendations

- Ministry of Urban Development and Housing should mandate subsurface geophysical assessments including electrical resistivity and magnetic surveys before approving major construction projects on university campuses in seismically sensitive regions.
- Haramaya University Construction Project Office should avoid new buildings in the central and southeastern parts of the campus where geophysical surveys detected shallow fractures and weak geological contacts (Profiles 3 and 4) as these areas

are unsuitable for future construction.

- National Disaster Risk Management Commission should incorporate geophysical fault-mapping into local earthquake preparedness and land-use planning guidelines.
- Engineering and construction firms working with universities should integrate geophysical results into building design to ensure adherence to seismic-resistant standards.



Radiological Safety of Khat Consumption: Evidence from Soil and Leaf Analysis in Grawa District East Hararghe, Ethiopia

Mesay Techan¹, Gelana Amente¹, Eshetu Diriba¹, and Tekleweyni Berhe¹

¹Department of Physics, College of Natural and Computational Sciences, Haramaya University, Ethiopia

Key Messages

- Khat leaves in Gurawa District accumulated measurable natural radioactivity, with mean activity concentrations of ^{238}U = 6.54 Bq/kg, ^{232}Th = 12.58 Bq/kg, and ^{40}K = 361.4 Bq/kg.
- The annual ingestion effective dose from consuming khat exceeded the international commission on radiological protection (ICRP) public dose limit (1 mSv/year) and was more than three times higher than the recommended 0.3 mSv/year dose constraint for a single exposure source.
- Some khat samples produced ingestion doses up to 3.01 mSv/year, indicating potential long-term health risks particularly for heavy, daily khat chewers.

Grawa District of East Hararghe is a major khat-producing area. Local communities have reported unusual phenomena such as spontaneous fires and glowing embers prompting concerns about unseen environmental hazards. As khat consumption is culturally widespread and often daily, understanding its radiological safety is essential. This study provides the first systematic measurement of natural radioactivity levels in both soil and khat leaves from three kebeles (Tuta Jenata, Mudana Jiru Balina, and Gorro), offering evidence to inform public health guidance, agricultural monitoring, and regulatory actions.

Approaches and Results

Twelve soil samples (0–30 cm depth) and twelve khat leaf samples were collected from khat farms across three kebeles of Gurawa District. All samples were dried, homogenized, and analyzed using a high-purity germanium (HPGe) gamma-ray detector at the Ethiopian Technology Authority laboratory. Activity concentrations of ^{238}U , ^{232}Th , ^{235}U , and ^{40}K , along with derived radiological hazard indices such as radium equivalent activity, absorbed dose rate, annual effective dose, hazard indices (Hex, Hin), and excess lifetime cancer risk (ELCR) were calculated following UNSCEAR and ICRP standards.

Introduction

Naturally occurring radioactive materials (NORM) such as uranium (^{238}U , ^{235}U), thorium (^{232}Th), and potassium-40 (^{40}K) exist in all soils, foods, and plants. Their concentrations vary with geology, soil chemistry, and crop type. While these radionuclides are generally low, prolonged ingestion of contaminated crops can increase internal radiation exposure, posing potential health risks such as cancer, organ damage, and genetic effects. In Eastern Ethiopia, where khat (*Catha edulis*) is widely cultivated and consumed, assessing radionuclide transfer from soil to edible plant parts is both a public health and economic priority.

The analysis of soil samples collected from Grawa District showed that activity concentrations of naturally occurring radionuclides were generally within international safety limits.

The measured mean concentrations were 17.22 ± 1.22 Bq/kg for ^{238}U , 34.50 ± 2.67 Bq/kg for ^{232}Th , 275.75 ± 4.11 Bq/kg for ^{40}K , and 2.26 ± 0.64 Bq/kg for ^{235}U , with the latter being slightly elevated compared to typical natural soil levels. Corresponding radiological hazard indices including radium equivalent activity (87.79 Bq/kg), absorbed dose rate (40.71 nGy/h), outdoor annual effective dose (0.05 mSv/y), indoor annual effective dose (0.20 mSv/y), and excess lifetime cancer risk (0.17×10^{-3}) were all below global average reference values.

Khat leaves collected from the same farms, however, exhibited detectable transfer of radionuclides from soil to plant. The mean activity concentrations were 6.54 ± 1.02 Bq/kg for ^{238}U , 12.58 ± 0.88 Bq/kg for ^{232}Th , and 361.4 ± 25.1 Bq/kg for ^{40}K , with levels generally lower than

those found in khat from Kenya and Yemen except for higher ^{238}U compared to Yemeni khat, suggesting site-specific uptake patterns that

warrant attention. The estimated annual ingestion effective dose for adults chewing 0.5 kg/day ranged from 0.37 to 3.01 mSv/year, with an average of 1.09 mSv/year a value exceeding the ICRP public dose limit of 1 mSv/year and more than three times the 0.3 mSv/year dose constraint recommended for exposure from a single food source. Some samples exceeded 3 mSv/year, indicating a potentially significant radiological intake for heavy daily consumers. Chronic ingestion at this level may elevate long-term risks, including stochastic health effects (such as cancer), increased radionuclide deposition in sensitive organs (bones, kidneys), and higher cumulative internal exposure among habitual khat chewers. Finally, the study was motivated in part by community reports of unexplained fires and glowing embers in Gurawa District; although soil radioactivity was within normal limits, the findings highlight the need for continued environmental monitoring to address public concerns through scientific evidence.

Table 1: Comparison of radionuclide concentrations and radiological hazard indicators.

Parameter	Soil (Mean $\pm$ SD)	Khat Leaves (Mean $\pm$ SD)	Global Reference / Limit (Bq/kg)
^{238}U (Bq/kg)	17.22 ± 1.22	6.54 ± 1.02	~35 (soil average)
^{232}Th (Bq/kg)	34.50 ± 2.67	12.58 ± 0.88	~45 (soil average)
^{40}K (Bq/kg)	275.75 ± 4.11	361.4 ± 25.1	~420 (soil average)
^{235}U (Bq/kg)	2.26 ± 0.64	—	No global reference
Radium Equivalent (Ra_eq)	87.79 Bq/kg	—	89 Bq/kg
Absorbed Dose Rate (nGy/h)	40.71	—	59
Outdoor Annual Dose (mSv/year)	0.05	—	0.07
Indoor Annual Dose (mSv/year)	0.2	—	0.41
Ingestion Dose (mSv/year)	—	1.09 (0.37–3.01)	1 mSv/y (ICRP limit); 0.3 mSv/y

Policy Recommendations

- Ministry of Health should provide public guidance on safe khat consumption and raise awareness about potential radiation-related health risks.
- Ethiopian Food and Drug Authority should require routine radionuclide testing for khat and establish permissible limits for radioactive elements in khat products.
- The Ethiopia Radiation Protection Authority should conduct periodic monitoring of soil and khat farms in Gurawa District and further investigate the elevated ^{235}U levels detected in the study.
- The Ethiopia Radiation Protection Authority should conduct periodic monitoring of soil and khat farms in Gurawa District and further investigate the elevated ^{235}U levels detected in the study.
- Ministry of Agriculture should integrate radiological screening into its extension services and support farmers in applying safe cultivation practices.
- Haramaya University and research institutions should continue long-term studies on soil-to-plant radionuclide transfer and provide technical support for local environmental monitoring efforts.



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- ኤረር-01 (Erer-01) የተሰኘው የማሽላ ዝርያ ከፍተኛ የአየር ንብረት የመቋቋም አቅም እንዳለው ተረጋግጧል። ይህ ዝርያ በትክክለኛው ወቅት ሲዘራ በባቢሌ የ12% እንዲሁም በፈዲስ የ6% የምርት ጭማሪ አሳይቷል።
- የሙቀት መጨመር የማሽላውን የዕድገት ጊዜ ያሳጥረዋል። የአበባ መውጫ እና የመድረሻ ጊዜውን ከ11 እስከ 37 ቀናት ድረስ ስለሚቀንሰው፣ ተክሉ ለሙቀት ጫና (Heat stress) እንዲጋለጥና የባዮማስ ክምችቱ እንዲቀንስ ያደርጋል።
- እንደ ትክክለኛ የመዝሪያ ወቅት፣ ተገቢው የማዳበሪያ አጠቃቀም እና የአየር ንብረት ተከላካይ ዝርያዎችን መጠቀም ያሉ "ለአየር ንብረት ተስማሚ የሆኑ የግብርና አሰራሮች" ሊከሰት የሚችለውን የምርት መቀነስ ሊያካክስ ይችላሉ። በጥሩ ሁኔታዎች ውስጥ ለመልካም (Melkam) ዝርያ 11.7%፣ ለኤረር-01 ደግሞ 12.2% መሻሻል ታይቷል።

መግቢያ

የሰብል ስርዓት ሞዴሎች ዘላቂ የምርት ስልቶችን ለመገምገም

እና የአየር ንብረት ለውጥ በሰብል ምርታማነት ላይ የሚያሳድረውን ተጽዕኖ ለመተንተን ወሳኝ ሚና ይጫወታሉ። እነዚህ ሞዴሎች የተከሉን ሥነ-ሕይወታዊ ሂደቶች ከአካባቢያዊ ሁኔታዎች እና ለተለያዩ ዝርያዎች እንዲሁም ቦታዎች ከሚሰጡ የአመራረት አማራጮች ጋር ያቀናጃሉ። የግብርና ቴክኖሎጂ ሽግግር ውሳኔ ድጋፍ ሰጪ ሥርዓት (DSSAT) የአየር ንብረት ተጽዕኖዎችን ለመተንተን እና የማላመጃ ስልቶችን ለመፈተሽ በዓለም አቀፍ ደረጃ እጅግ ተመራጭ እና አስተማማኝነቱ የተረጋገጠ መድረክ ነው።

በኢትዮጵያ ማሽላ ከጤፍና ከበቆሎ በመቀጠል በሚሊዮኖች የሚቆጠሩ አነስተኛ አምራች አርሶ አደሮችን የሚደግፍ ሦስተኛው ጠቃሚ የጥራጥሬ ሰብል ነው። ማሽላ ድርቅን የመቋቋም አቅም ቢኖረውም፣ በአየር ንብረት መለዋወጥ፣ ባልተሻሻሉ የግብርና አሰራሮች እና በማህበራዊና ኢኮኖሚያዊ እኩልነት ምክንያት ምርታማነቱ አነስተኛ ነው። እነዚህ ተግዳሮቶች በተለይ በምስራቅ ኢትዮጵያ ድርቅ በሚያጠቃቸው አካባቢዎች በሰፋነት ይታያሉ።

የምስራቅ ሐረርጌ ዞንን በተለይም የባቢሌ እና የፈዲስ ወረዳዎችን ተደጋጋሚ ድርቅ፣ መደበኛ ያልሆነ የዝናብ ስርጭት፣ የመሬት መሽርሽር እና ከአየር ንብረት ጋር የተያያዙ ችግሮች ያጋጥሟቸዋል። ይህም የሰብል ምርታማነትን በመቀነስ የአካባቢውን ማህበረሰብ ለችግር አጋልጧል። አነስተኛ አርሶ አደሮች ጥገና የሆኑት በዝናብ አዝመራ እና በባህላዊ የአመራረት ዘዴዎች ላይ በመሆኑ፣ የማሽላ ምርት ለዝናብ መዛባት፣ ለሙቀት መጨመር እና ለአፈር እርጥበት እጥረት በጣም ተጋላጭ ነው።

የወደፊት የአየር ንብረት ተጽዕኖዎች እንደየአካባቢው እና እንደ ሰብል ዝርያው ስለሚለያዩ፣ የማሽላ ምርት ለታቀደው የአየር ንብረት ለውጥ እንዴት ምላሽ እንደሚሰጥ በየአካባቢው በጥናት ማረጋገጥ አስቸኳይ ጉዳይ ነው። ስለዚህ ይህ ጥናት የታቀደው የአየር ንብረት ለውጥ በማሽላ ምርት ላይ የሚያሳድረውን ተጽዕኖ ለመገምገም እና በምስራቅ ኢትዮጵያ የሚገኘውን ማህበረሰብ የመቋቋም አቅም የሚያጠናክሩ የግብርና ማላመጃ ስልቶችን ለመለየት ያለመ ነው።

የአሰራር ዘዴ እና ውጤቶች

ጥናቱ በባቢሌ እና በፈዴሰ ወረዳዎች የወደፊት የአየር ንብረት ሁኔታዎች በማሽላ ምርት ላይ የሚያሳድሩትን ተጽዕኖ ለመገምገም የDSSAT የሰብል ሞዴልን ተጠቅሟል። የአየር ሁኔታ፣ የአፈር እና የሰብል መረጃዎች ተሰብስበዋል፤ እንዲሁም የወደፊት የአየር ንብረት ትንበያዎች ከCORDEX-Africa ሞዴሎች (downscaled) ተወስደዋል። አራት የማሽላ ዝርያዎች በመስክ መከራዎች አማካኝነት የተፈተሹ ሲሆን፣ በRCP4.5 እና RCP8.5 የአየር ንብረት ሁኔታዎች ስር የምርት ምላሾችን ለመገምገም ማስሌዎች (simulations) ተካሂደዋል። ጥናቱ የአየር ንብረት ሁኔታ ውስጥ የማሽላ የመቋቋም አቅምን የሚያጠናክሩ ስልቶችን ለመለየት የተለያዩ የማላመጃ አማራጮችን (የመዝሪያ ቀናትን፣ የማዳበሪያ መጠኖችን እና የተክል እፍጋትን) መርምሯል።

ጥናቱ ከ1990–2021 ያለውን የአየር ንብረት መረጃ ተንትኗል፤ እንዲሁም በ2050ዎቹ እና 2080ዎቹ ውስጥ በባቢሌ እና በፈዴሰ ወረዳዎች የማሽላ አፈጻጸምን ለመገመት ስምንት የGCM ጥምር ትንበያዎችን በRCP4.5 እና RCP8.5 ስር ተጠቅሟል። የCERES-Sorghum ሞዴል የሰብል እድገትን እና ምርትን በትክክል የገለጸ ሲሆን፣ በሁሉም ዝርያዎች እና ቦታዎች (simulated) እና በሚታየው (observed) እሴቶች መካከል ጠንካራ መመሳሰል አሳይቷል።

የወደፊት የአየር ንብረት ትንበያዎች በሁለቱም ወረዳዎች ላይ ግልጽ የሆነ የሙቀት መጨመር አዝማሚያ ያሳያሉ። በRCP8.5 ሁኔታ እስከ 2080ዎቹ ድረስ፣ ከፍተኛው የሙቀት መጠን (T_{max}) እስከ 4.1°C ይጨምራል ተብሎ ይጠበቃል፤ አነስተኛው የሙቀት መጠን (T_{min}) ደግሞ እስከ 2.7°C ይጨምራል ተብሎ ይገመታል። በአንጻሩ የዓመታዊ ዝናብ ትንበያዎች የተቀላቀለ ባህሪ ያሳያሉ። ምንም እንኳን በሁለቱም ወረዳዎች የዝናብ መቀነስ ቢታይም፣ መጠኑ ይለያያል፡- በባቢሌ በ2080ዎቹ በRCP4.5 ስር ዝናብ በ35.24% እንደሚቀንስ ሲተነበይ፣ በፈዴሰ ግን በተመሳሳይ ጊዜ እና ሁኔታ በ58.2% እጅግ የከፋ ቅናሽ እንደሚኖር ይጠበቃል። እነዚህ ለውጦች በመላ ኢትዮጵያ የታዩትን የዝናብ መቀነስ አዝማሚያዎች ከሚያሳዩ ቀጣናዊ ጥናቶች ጋር ይጣጣማሉ።

ሠንጠረዥ 1: የዓመታዊ ዝናብ እና ሙቀት መጠን ለውጦች ገላጭ እስታቲስቲክስ

ባቢሌ ወረዳ							
ሁኔታ	የጥናት ጊዜ	ዓመታዊ ዝናብ (ሚ.ሜ)	የዝናብ ለውጥ (ΔRF %)	ከፍተኛ ሙቀት (T_{max} $^{\circ}\text{C}$)	አነስተኛ ሙቀት (T_{min} $^{\circ}\text{C}$)	የከፍተኛ ሙቀት ለውጥ (ΔT_{max} $^{\circ}\text{C}$)	የአነስተኛ ሙቀት ለውጥ (ΔT_{min} $^{\circ}\text{C}$)
መነሻ	1990-2021	754.02		29.1	17.4		
RCP4.5	2050ዎቹ	554.4	-26.47	30.9	17.4	1.8	0.0
RCP4.5	2080ዎቹ	488.3	-35.24	31.4	18.0	2.3	0.6
RCP8.5	2050ዎቹ	760.0	0.79	31.6	18.0	2.5	0.6
RCP8.5	2080ዎቹ	697.7	-7.46	33.2	20.1	4.1	2.7
ፈዴሰ ወረዳ							
መነሻ		908.7		27.6	14.6		
RCP4.5	2050ዎቹ	769.3	-15.3	29.4	16.5	1.8	1.9
RCP4.5	2080ዎቹ	380.0	-58.2	29.9	17.1	2.3	2.5
RCP8.5	2050ዎቹ	588.3	-35.3	30.0	17.2	2.4	2.6
RCP8.5	2080ዎቹ	896.2	-1.4	31.7	19.2	4.1	4.6

በስምሌሽን የተገለጹ የሰብል ዕድገት ምላሾች (Simulated Crop Growth Responses) እንደሚታዩት፤ በአብዛኛዎቹ የአየር ንብረት ሁኔታዎች የማሽላ የዕድገት ሂደት (Phenology) በአጠቃላይ ያጥራል። ይህም የአበባ መውጫ (Anthesis) እና ለፊዚዮሎጂያዊ ብስለት (Physiological maturity) የሚፈጅባቸው ቀናት ቁጥር በመቀነሱ የሚታይ ነው። ሆኖም ግን፤ የተለዩ ሁኔታዎች ታይተዋል፡- የመልካም (Melkam) ዝርያ በ2050ዎቹ በRCP4.5 ሁኔታ ስር የተረጋጋ የአበባ መውጫ ጊዜ አሳይቷል። ፈዲስ-01 (Fedis-01) እና ኤረር-01 (Erer-01) በ2050ዎቹ እና በ2080ዎቹ በRCP8.5 ሁኔታ ስር የአበባ መውጫ ጊዜያቸው ሳይለወጥ ቀርቷል (ሠንጠረዥ 2)። እነዚህ ለየት ያሉ ሁኔታዎች በባቢሌ ወረዳ በሚገኙ ዝርያዎች መካከል ከፍተኛ የሙቀት መቋቋም ልዩነት እንዳለ ያመለክታሉ። በአንጻሩ በፈዲስ ወረዳ የዕድገት ደረጃዎቹ እንደየዝርያው እና እንደ አየር ንብረት ሁኔታው ሊፋጠኑ ወይም ሊዘገቡ እንደሚችሉ ተተንብዮአል።

የአየር ንብረት ለውጥ ትንበያዎች በሁለቱም ወረዳዎች የማሽላ ምርት እንደሚቀንስ ያመለክታሉ፤ በተለይም ከሰኔ 08 በፊት ሲዘራ ጉዳቱ የላቀ ነው። ቀድሞ መዝራት በሁሉም ዝርያዎች፤

የአየር ንብረት ሁኔታዎች እና የጊዜ ገደቦች ውስጥ የምርት መቀነስን አስከትሏል፤ ይህም በሰብሉ የመጀመሪያ የእድገት ደረጃዎች ላይ የሚከሰት ከፍተኛ ሙቀት እና የእርጥበት እጥረት ምርታማነትን በከፍተኛ ሁኔታ እንደሚቀንሰው ያረጋግጣል። በተመሳሳይ ሁኔታ፤ ዘግይቶ መዝራት (ከሐምሌ 03 በኋላ) ለከፍተኛ የምርት መቀነስ ምክንያት ሆኗል፤ ምክንያቱም ሰብሉ ወሳኝ ወደሆነው የመራቢያ (Reproductive) ደረጃ ከመድረሱ በፊት ዝናቡ የመቆም አዝማሚያ ስለሚያሳይ ነው (ሠንጠረዥ 2 እና 3)።

እነዚህ ግኝቶች በምስራቅ አፍሪካ ለሚታየው የማሽላ ምርት መቀነስ ዋናው መንስኤ የጅማሬ ወቅት ድርቅ እና የከረምት ማብቂያ የእርጥበት እጥረት መሆናቸውን ከሚገልጹ ቀዳሚ ጥናቶች ጋር ይጣጣማሉ። ምንም እንኳን ትክክለኛው የመዝራያ ወቅት እንደየወረዳው ትንሽ ልዩነት ቢኖረውም፤ በአጠቃላይ በሰኔ 18 አካባቢ መዝራት ምርትን እንደሚያሻሽል ታይቷል። ይህም በተለይ በባቢሌ የሚገኙትን የመልካም፣ ተሻለ እና ኤረር-01 ዝርያዎችን እንዲሁም በፈዲስ የሚዘሩትን ሁሉንም ዝርያዎች ምርታማነት ይጨምራል። በRCP4.5 ሁኔታ ስር፤ በ2050ዎቹ ውስጥ ከፍተኛው የምርት መሻሻል ለመልካም ዝርያ +11.7% እንዲሁም ለኤረር-01 +12.2% ደርሷል። በRCP8.5 ሁኔታ ስር የሚገኘው ጥቅም በአንጻሩ አነስተኛ ቢሆንም፤ አሁንም በበርካታ ሁኔታዎች ውስጥ አምንታዊ ውጤት ታይቷል (ሠንጠረዥ 2 እና 3)።

ሠንጠረዥ 2: በ2050 እና በ2080ዎቹ በባቢሌ ወረዳ በተለያዩ የመዝራያ ወቅቶች የሚጠበቀው የዝርያዎች ምርት ለውጥ (%)

ዝርያዎች	መነሻ ምርት (ኪ.ግ በሄክታር)	የመዝራያ ወቅቶች	RCP4.5		RCP8.5	
			2050ዎቹ	2080ዎቹ	2050ዎቹ	2080ዎቹ
መልካም (Melkam)	2500	ሰኔ 08	-5.3	-2.4	-6.9	-2.8
		ሰኔ 18	11.7	8.7	2.1	1.8
		ሐምሌ 03	-4.1	-5.6	-4.3	-1.2
ተሻለ (Teshale)	2556	ሰኔ 08	-4.1	-1.5	-1.8	-2.6
		ሰኔ 18	9.7	-1.6	4.3	-5.4
		ሐምሌ 03	2.4	3.7	7.2	4.9
ኤረር-01 (Erer-01)	2278	ሰኔ 08	-4.3	-6.4	-7.1	-3.7
		ሰኔ 18	12.2	4.7	12.1	2.7
		ሐምሌ 03	-21.1	-13.6	3.3	-1.2
ፈዲስ-01 (Fedis-01)	2166	ሰኔ 08	5.3	-5.5	4.5	2.6
		ሰኔ 18	-7.3	-6.6	4.1	-3.7
		ሐምሌ 03	3.1	4.7	7.2	3.3

ሠንጠረዥ 3: በ2050 እና በ2080ዎቹ በፈዴራል ወረዳ በተለያዩ የመዝሪያ ወቅቶች የሚጠበቀው የዝርያዎች ምርት ለውጥ (%)

ዝርያዎች	መነሻ (ኪ.ግ በሄክታር)	ምርት	የመዝሪያ ወቅቶች	RCP4.5		RCP8.5	
				2050ዎቹ	2080ዎቹ	2050ዎቹ	2080ዎቹ
መልካም (Melkam)	3277	ሰኔ 08		-3.7	-4.4	-1.1	-3.2
		ሰኔ 18		3.3	-6.3	-13.1	4.2
		ሐምሌ 03		-16.1	-9.6	-21.3	-4.8
ተሻለ (Teshale)	2777	ሰኔ 08		-5.1	-3.5	-8.8	-8.6
		ሰኔ 18		4.7	3.6	3.3	1.7
		ሐምሌ 03		7.2	-8.7	4.2	-4.9
ኤረር-01 (Erer-01)	2722	ሰኔ 08		-9.7	-5.5	-0.4	-2.1
		ሰኔ 18		5.3	6.1	-6.3	4.3
		ሐምሌ 03		-13.3	-17.5	-14.1	5.3
ፊደስ-01 (Fedis-01)	3500	ሰኔ 08		-2.1	-3.5	-3.8	-8.6
		ሰኔ 18		1.4	1.6	2.3	1.2
		ሐምሌ 03		6.1	-13.7	5.2	1.9

ባጠቃላይ፣ የሞዴሉ ውጤቶች እንደሚያሳዩት የአየር ንብረት ለውጥ በባቢሌም ሆነ በፈዴራል የሙቀት እና የውሃ እጥረትን (stress) በመጨመር የማሽላ ምርትን ይቀንሳል። ይህንን ለመከላከል የማላመጃ እርምጃዎችን መተግበር የግድ ይላል። የመዝሪያ ወቅትን ወደ ሰኔ መጨረሻ በማዛወር፣ እንደ ኤረር-01 (Erer-01) ያሉ የአየር ንብረት ተፅዕኖ ተቋቋሚ ዝርያዎችን በመምረጥ እና የአመራረት ዘዴዎችን በማሻሻል፣ በአየር ንብረት ለውጥ ምክንያት የሚመጣውን የምርት ኪሳራ መቀነስ እና የማሽላ ምርታማነትን ማጠናከር ይቻላል። በምስራቅ ኢትዮጵያ የወደፊቱን የምርት ዋስትና ለማረጋገጥ፣ ትክክለኛ የመዝሪያ ቀናትን እና ተስማሚ የዝርያ ምርጫን ያካተተ "ለአየር ንብረት ተስማሚ የሆነ የግብርና አመራረት ስብስብ" (Climate-smart management package) ተግባራዊ ማድረግ እጅግ አስፈላጊ ነው።

የፖሊሲ ምክሮች

- የግብርና ሚኒስቴር እና የክልል ግብርና ቢሮዎች፡- በወረዳ ደረጃ የማላመጃ ፕሮግራሞችን እና ተመሳሳይ ሥነ-ምህዳር ያላቸውን አካባቢዎች በማቀናጀት፣ የአየር ንብረት ተፅዕኖ ተቋቋሚ የሆኑ የማሽላ ዝርያዎች ተደራሽነታቸውን ሊመሩ ይገባል።

- የግብርና ምርምር ተቋማት እና የዘር ኢንተርፕራይዞች፡- ለአየር ንብረት ለውጥ ዝግጁ የሆኑ ዝርያዎች በቋሚነት እንዲመረቱና እንዲሰራጩ ማድረግ አለባቸው። በተለይም ኤረር-01 (Erer-01) ዝርያ በወደፊት የአየር ንብረት ሁኔታዎች ውስጥ ጠንካራ የመቋቋም አቅም እና የተረጋጋ አፈጻጸም ስላሳየ፣ ለባቢሌ፣ ለፈዴራል እና ለተመሳሳይ አካባቢዎች ቅድሚያ ሊሰጠው ይገባል።

- የግብርና ሚኒስቴር፡- ውሳኔ ሰጪዎች የአየር ንብረት ስጋቶችን፣ የሰብል ፈረቃን እና የአፈር ጤና ግንኙነቶችን በበለጠ ውጤታማነት እንዲገመገሙ ለማስቻል፣ የላቁ የሰብል ሞዴሊንግ መሣሪያዎችን በመደበኛ የውሳኔ አሰጣጥ ሂደት ውስጥ በማካተት በማስረጃ ላይ የተመሰረተ የአየር ንብረት እቅድን ማስተዋወቅ ይኖርበታል።

- የኢትዮጵያ ሜቲዮሮሎጂ ኢንስቲትዩት እና የግብርና ኤክስቴንሽን ባለሙያዎች፡- በታቀደው የአየር ንብረት ሁኔታ ውስጥ የምርት ጭማሪን ከፍ ለማድረግ፣ ለአርሶ አደሮች እንደየዝርያው ዓይነት የሚሰጥ የአመራረት ስልጠና እና ተስማሚ የምክር አገልግሎቶችን ማቅረብ አለባቸው።



ሐረማያ ዩኒቨርሲቲ

የምርምር ጉዳዮች ጽ/ቤት

የፖሊሲ መግለጫ 1.2
ግንቦት 2018

የምርምር ትኩረት
መስክ

I

በማስረጃ የተደገፈ የጤና ጥበቃ ዕቅድ በላምና በግመል ጥጃዎች ጤና እና ምርታማነት ላይ የሚኖረው ፋይዳ

ይሄንው ጌታሁን፣ አምባቸው ሞትባይኖር፣ ሺሁን ሽመልስ፣ እና ሚና ዓሊ፣

የአንስሳት ሕክምና ኮሌጅ፣ ሐረማያ ዩኒቨርሲቲ፣ ሐረማያ፣ ኢትዮጵያ

ቁልፍ መልዕክቶች

- ከተለመደው የአያያዝ ዘዴ ጋር ሲነፃፀር፣ ዕለታዊ የጤና ዕቅድን መተግበር የታመሙ ጥጃዎችን መጠን (morbidity) ወደ 29.5%፣ የሞት መጠኑን (mortality) ደግሞ ወደ 10.4% በከፍተኛ ሁኔታ ቀንሷል።
- ጥጃ በተወለደ በስድስት ሰዓታት ውስጥ የእንገር ወተት እንዲጠጣ ማድረግ የመተርፍ ዕድሉን በከፍተኛ ሁኔታ ይጨምራል፤ ይህም የበሽታ ተጋላጭነትን በ 52%፣ የሞት መጠንን ደግሞ በ 66% ለመቀነስ አስችሏል።
- ዕድሜያቸው ከ3 ወር በታች የሆኑ ጥጃዎች ለበሽታና ለሞት የመጋለጥ ዕድላቸው ከፍተኛ መሆኑ ተረጋግጧል፤ ይህም በመጀመሪያዎቹ የዕድሜ ክልሎች ላይ ጠንካራ እንክብካቤ ማድረግ እንደሚያስፈልግ ያሳያል።
- ተባዕት ጥጃዎች ከሴት ጥጃዎች ጋር ሲነፃፀሩ ለበሽታ የመጋለጥ ዕድላቸው በሁለት እጥፍ ገደማ ብልጫ አለው፤ ይህም የአያያዝ ትኩረት ወጥነት እንደሌለው (ለተባዕት ጥጃዎች የሚሰጠው ትኩረት አነስተኛ መሆኑን) ያመለክታል።
- የጤና ዕቅዱ የጥጃዎችን እድገት አሻሽሏል፤ ይህም የቀን ክብደት መጨመርን በ 4.4%፣ እንዲሁም ጡት በሚጥሉበት ወቅት የሚኖራቸውን ክብደት በ 4.5% እንዲጨምር አድርጓል።

መግቢያ

ኢትዮጵያ በፍጥነት እያደገ የመጣውን የወተት እና የወተት ተዋጽኦዎች ሀገራዊ ፍላጎት ለማሟላት፣ ለገበያ ተኮር የሆኑ ሰፊ እና አነስተኛ የወተት ምርት ሥርዓቶችን ለማስፋፋት ቅድሚያ ሰጥታ እየሰራች ትገኛለች። በቆላማ የአርብቶ አደር እና ከፊል አርብቶ አደር አካባቢዎች ደግሞ፣

በተለይም አነስተኛ ዝናብ ባለባቸው ሁኔታዎች፣ ግመሎች ለወተት እና ለገቢ ምንጭነት ወሳኝ ሚና አላቸው። ይሁን እንጂ፣ እነዚህ ብሔራዊ የአንስሳት ሀብት ልማት እንቅስቃሴዎች በጥጃዎች ላይ በሚታየው ከፍተኛ የበሽታ ተጋላጭነት እና የሞት መጠን ሳቢያ ለከፍተኛ እንቅፋት እየተዳረጉ ይገኛሉ።

መረጃዎች እንደሚያመለክቱት በኢትዮጵያ የወተት ላም ጥጃዎች የበሽታ ተጋላጭነት እና የሞት መጠን በቅደም ተከተል 47.3% እና 17.9% ደርሷል። በተመሳሳይ ሁኔታ የግመል ጥጃዎች የበሽታ ተጋላጭነት 35% እንዲሁም የሞት መጠናቸው 9% አካባቢ ነው። እነዚህ ኪሳራዎች ተተኪ እንስሳትን የማግኘት ዕድልን፣ ምርታማነትን እና የረጅም ጊዜ የወተት እና የግመል የገበያ ስንሰለት ዘላቂነትን አደጋ ላይ ይጥላሉ።

ጥጃዎች በመሞታቸው፣ ለሕክምና በሚወጣ ወጪ፣ በእድገት መቀነስ እና በሕይወት ዘመናቸው የሚሰጡት የወተት ምርት በመቀነሱ ምክንያት የሚመጣው የኢኮኖሚ ጉዳት ከፍተኛ ነው። ከዚህም በተጨማሪ ጥናቶች እንደሚያመለክቱት የተሻሻሉ የጥጃ አያያዝ ዘዴዎችን (ወቅታዊ የእንገር ወተት መመገብን፣ የተሻለ መጠለያን፣ ንጽህናን እና የበሽታ መከላከልን ጨምሮ) በመተግበር የጥጃዎችን የጤና ችግር በከፍተኛ ሁኔታ መቀነስ እና ውጤታማነታቸውን ማሳደግ ይቻላል።

ሀገሪቱ የእንስሳት ሀብት ልማትን ለማጠናከር እና የወተት ዘርፉን ወደ ላቀ ደረጃ ለመቀየር ትኩረት ሰጥታ እየሰራች ባለችበት በዚህ ወቅት፣ የጥጃዎችን በሽታና ሞት መቀነስ እጅግ አስፈላጊ ነው። የጥጃዎችን ጤና እና እድገት ማሻሻል የሚቻለው ትክክለኛ የጤና እና የአያያዝ ልምዶችን በማዘጋጀትና በተግባር ላይ በማዋል ነው። ስለሆነም በተግባር የተፈተኑ እና በማስረጃ ላይ የተመሰረቱ የጥጃ ጤና ዕቅዶች የኢትዮጵያን የወተት እና የግመል ምርት ግቦች

ለማሳካት ከፍተኛ ተፅዕኖ ያላቸው እና ተግባራዊ ሊሆኑ የሚችሉ መንገዶች ናቸው።

ሲሆን፤ በቁራኛ ቡድኑ 49.34% ጋር ሲነጻጸር ዝቅተኛ ነው። እንዲሁም የሞት መጠን በሙከራታዊ ቡድኑ 10.42% ሲሆን በተቆጣጣሪ ቡድኑ 19.75% ሆኖ ተመዝግቧል።

አቀራረቦች እና ውጤቶች

በማስረጃ ላይ የተመሰረተ ዕለታዊ የጥጃዎች ጤና ዕቅድ በበሽታ ተጋላጭነት፤ በሞት መጠን እና በእድገት ላይ ያለውን ተፅዕኖ ለመገምገም ከየካቲት 2015 እስከ ጥቅምት 2016 በድሬዳዋ እና ሐረር በሚገኙ የወተት እርሻዎች ላይ ቁጥጥር የተደረገበት የሙከራ ጥናት (Randomized Controlled Trial) ተካሂዷል። ለዚህም 137 የስምንት ወርና ከዚያ በላይ የሆናቸው እርጉዝ ላሞች ተመርጠዋል። ጥጃዎቹ እንደተወለዱ በሁለት ቡድን ተከፍለዋል፡- ሙከራታዊ ቡድን (experimental group)፡ የተቀናጀ ዕለታዊ የጤና ዕቅድ የተተገበረላቸው እና ቁራኛ ቡድን (control group)፡ በተለመደው ልማዳዊ አሰራር ያደጉ። ጥጃዎቹ ለስድስት ወራት በየሳምንቱ ከትትል ተደርጎላቸዋል። በሂደቱም የውልደትና የጡት መጣያ ክብደት፤ የቀን አማካይ የክብደት መጨመር (ADWG)፤ እንዲሁም የአያያዝ ሁኔታዎች (የእንግር ወተት አሰጣጥ፤ መጠለያ፤ የዕድሜ መቀላቀል፤ ንጽህና እና የእቃ ማጠቢያ ልምዶች) ተመዝግበዋል።

የበሽታ ተጋላጭነት በሙከራታዊ ቡድኑ 24% ሲሆን በቁራኛ ቡድኑ 40% ሆኖ ተገኝቷል። የሞት መጠንም በሙከራታዊ ቡድኑ 13% ሲሆን በተቆጣጣሪ ቡድኑ 24% ነበር፤ ይህም የጤና ዕቅዱ የተተገበረላቸው ጥጃዎች የተሻለ የመትረፍ ዕድል እንዳላቸው ያሳያል። በጥናቱ ማጠቃለያ ላይ የታየው የበሽታ ተጋላጭነት መጠን በሙከራታዊ ቡድኑ 29.53%

ለበሽታ እና ለሞት ተጋላጭነት ዋነኛ መንስኤ ተብለው የተለዩትና የተተገበረው የአያያዝ ዘዴ፤ ጾታ፤ ዕድሜ እና የእንግር ወተት አሰጣጥ ሰዓት ናቸው። በቁራኛ ቡድን ውስጥ የነበሩ ጥጃዎች የመሞት ዕድላቸው በሙከራታዊ ቡድኑ ጥጃዎች ጋር ሲነጻጸር በሦስት እጥፍ ገደማ (HR = 2.78) ብልጫ አለው። በተቃራኒው እንግር ወተትን ቀድሞ መመገብ የሞት አደጋን በሁለት ሦስተኛ (HR = 0.34) ለመቀነስ አስችሏል። በተጨማሪም ዕድሜያቸው ሦስት ወርና ከዚያ በታች የሆኑ ጥጃዎች የመሞት ዕድላቸው ከሦስት እጥፍ (HR = 3.61) በላይ መሆኑ ተረጋግጧል። ተባዕት ጥጃዎች ከሴት ጥጃዎች ጋር ሲነጻጸሩ ለመታመም ያላቸው ዕድል በሁለት እጥፍ ገደማ (HR = 2.03) ከፍ ያለ ሲሆን፤ ጥጃ በተወለደ በስድስት ሰዓታት ውስጥ እንግር ወተት እንዲጠጣ ማድረግ ግን የመታመም ዕድሉን በግማሽ (HR = 0.48) ይቀንሰዋል።

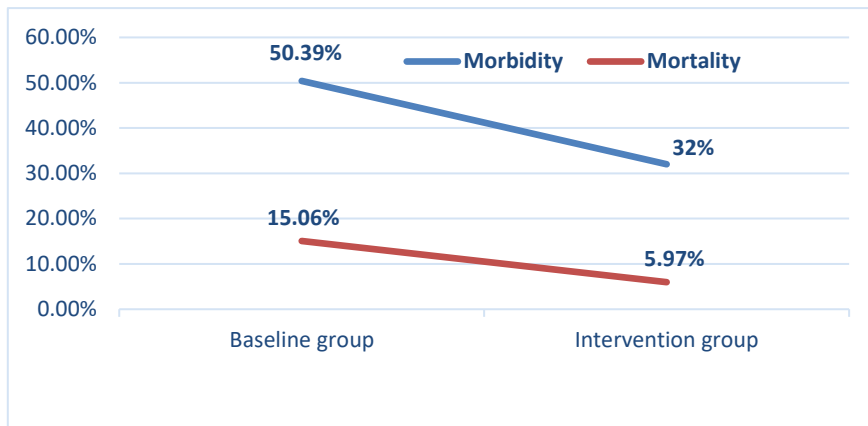
በጤና ዕቅዱ ትግበራ የታየው የእድገት ውጤታማነት ከፍተኛ መሻሻል አሳይቷል። የቀን አማካይ የክብደት መጨመር (ADWG) በሙከራታዊ ቡድኑ 0.776 ± 0.09 ኪ.ግ ሲሆን በቁራኛ ቡድኑ ደግሞ 0.743 ± 0.069 ኪ.ግ ሆኖ ተመዝግቧል ($p=0.042$)።

በተመሳሳይ ሁኔታ፤ ጡት በሚጥሉበት ወቅት የነበራቸው ክብደት በሙከራታዊ ቡድኑ 154.37 ኪ.ግ ሲሆን በቁራኛ ቡድኑ ከነበረው 147.73 ኪ.ግ ጋር ሲነጻጸር በሳይንሳዊ ስሌት ጉልህ ብልጫ አለው ($p<0.001$)። የጥናቱ ውጤት እንደሚያረጋግጠው፤ ሌሎች ጣልቃ ጉብነቶች እና በቀን 3 ሊትር እና ከዚያ በላይ ወተት መመገብ ለጥጃዎች የቀን ክብደት መጨመር ከፍተኛ አስተዋጽኦ አላቸው።

ሠንጠረዥ 1፡ የጥጃዎች የውልደት ክብደት፤ የጡት መጣያ ክብደት እና የቀን ክብደት መጨመር

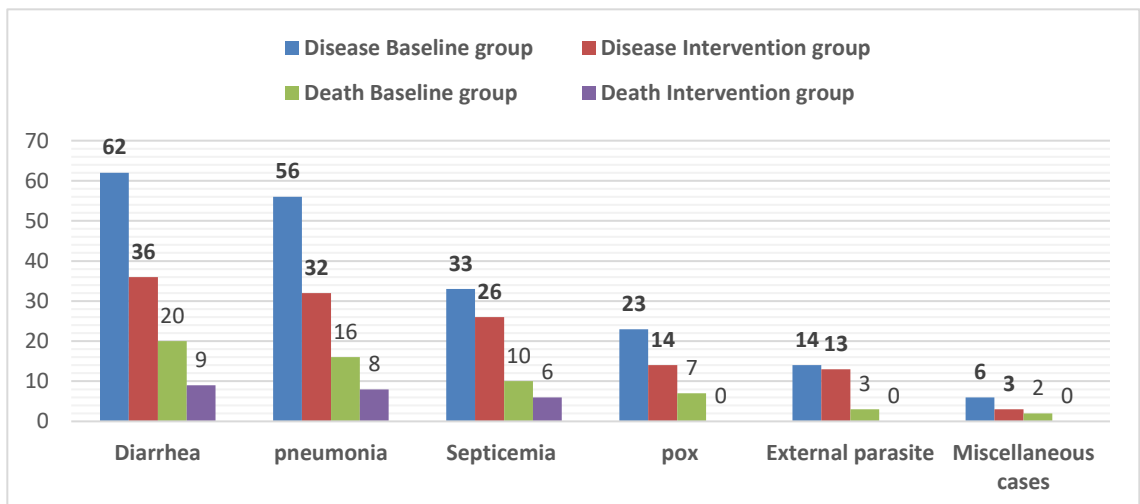
ዋና ዋና ግኝቶች ኪ.ግ	በቁራኛ ቡድኑ (አማካይ $\pm$ መደበኛ ልውጠት)	በሙከራታዊ ቡድኑ (አማካይ $\pm$ መደበኛ ልውጠት)	t-test	p-value
የውልደት ክብደት	34.616 $\pm$ 4.241	34.966 $\pm$ 4.700	-0.457	0.648
ጡት የሚጥሉበት ክብደት	147.727 $\pm$ 4.361	154.373 $\pm$ 6.579	-6.172	<0.001 *
የቀን አማካይ ክብደት መጨመር	0.743 $\pm$ 0.069	0.776 $\pm$ 0.095	-2.056	0.042 *

በግመል ጥጃዎች ላይ የታየው የበሽታ ተጋላጭነት (morbidity) በቁራኛ ቡድኑ (control group) ከነበረበት 50.39% በሙከራታዊ ቡድኑ (experimental group) ውስጥ ወደ 32.21% ዝቅ ብሏል። በተመሳሳይ ሁኔታ የሞት መጠን (mortality) በቁራኛ ቡድኑ ከነበረበት 15.06% ወደ 5.97% በሙከራታዊ ቡድኑ ውስጥ ቀንሷል (ምስል 1)።



ምስል 1: በመሠረታዊ (Baseline) እና በመከራ (Intervention) ቡድኖች ውስጥ የታየው የጥጃዎች የበሽታ ተጋላጭነት (Morbidity) እና የሞት መጠን (Mortality)

በሁለቱም ቡድኖች ውስጥ ተቅማጥ እና የሳምባ ምች በብዛት የታዩ የጤና ችግሮች ነበሩ፤ ሆኖም ግን ሁለቱም በሽታዎች



በመከራ ቡድኑ (intervention group) ውስጥ በከፍተኛ ሁኔታ ቀንሰው ተገኝተዋል (ምስል 2)።

ምስል 2: በሁለቱ የጥጃ ቡድኖች ውስጥ የታየው የበሽታዎች ስርጭት መጠን (Morbidity incidence rate)

የጤና ዕቅዱ በተተገበረበት ቡድን (Intervention group) ውስጥ ያሉት የግመል ጥጃዎች ጡት በሚጥሉበት ወቅት የነበራቸው ክብደት (105.22 ± 3.1 ኪ.ግ) ከተቆጣጣሪ ቡድኑ (96.43 ± 2.4 ኪ.ግ) ጋር ሲነጻጸር በከፍተኛ ሁኔታ ብልጫ አለው (ሠንጠረዥ 2)።

ሠንጠረዥ 2፡- የግመል ጥጃዎች የውልደት፣ የጡት መጣያ እና የቀን ክብደት መጨመር

ዋና ዋና ግኝቶች ኪ.ግ	በቁራኛ ቡድኑ (አማካይ $\pm$ መደበኛ ልውጣት)	በመከረታዊ ቡድኑ (አማካይ $\pm$ መደበኛ ልውጣት)	t-test	P value
የውልደት ክብደት	34.31 $\pm$ 0.94	34.26 $\pm$ 0.92	0.54	0.613
ጡት የሚጥሉበት ክብደት	96.43 $\pm$ 2.4	105.22 $\pm$ 3.1	-98.25	<0.001
የቀን አማካይ ክብደት መጨመር	0.23 $\pm$ 0.01	0.26 $\pm$ 0.02	-0.37	0.714

ይህ ጥናት በማስረጃ ላይ የተመሰረተ የጥጃዎች የጤና ዕቅድን መተግበር ጥጃዎች ጡት ከመጣላቸው በፊት ያለውን የመኖር ዕድል እና እድገት በከፍተኛ ሁኔታ እንደሚያሻሽል አረጋግጧል። የታየው ከፍተኛ የበሽታ እና የሞት መጠን መቀነስ፤ እንገር ወተትን በጊዜ መመገብ፤ ንጽህናን መጠበቅ እና ሥርዓት ያለው የጥጃ አያያዝ ልምዶች ያላቸውን ወሳኝ ሚና ያጠናክራል።

በለጋ ጥጃዎች ላይ የታየው ጠንካራ ውጤት፣ ጥጃዎቹ ገና የመከላከል አቅማቸው ስላልዳበረ ለጉዳት ያላቸውን ተጋላጭነት የሚያሳይ ነው። የተመዘገበው ከፍተኛ የቀን ክብደት መጨመር (ADWG) እና የተሻለ የጡት መጣያ ክብደት ደግሞ በመጀመሪያው የሕይወት ምዕራፍ የሚደረግ ጥንቃቄ የተሞላበት አያያዝ ወደ ላቀ ምርታማነት እንደሚቀየር ያረጋግጣል።

በአጠቃላይ እነዚህ ግኝቶች የሚያሳዩት የጥጃዎች የጤና ዕቅድ የጥጃዎችን ሕይወት ለማዳን ብቻ ሳይሆን ለወተት አምራቾችም የኢኮኖሚ ጥቅም ያለው መሆኑን ነው። ለማጠቃለል ያህል፣ የተቀናጀ ዕለታዊ የጥጃዎች ጤና ዕቅድ ጥጃዎች በሕይወት የመቆየት ዕድላቸውን ይጨምራል፤ በሽታን ይቀንሳል፤ እንዲሁም እድገትን ያሻሽላል፤ ይህም የኢትዮጵያን የወተት ምርት ሥርዓት ለማጠናከር ተግባራዊ ሊሆን የሚችል ትክክለኛ መንገድ ነው።

የፖሊሲ ምክሮች

- የግብርና ሚኒስቴር እና የክልል ግብርና ቢሮዎች ሊከላከሏቸው የሚችሉ የጥጃ ሞቶችን ለመቀነስ፣ ይህ ዕለታዊ የጥጃዎች የጤና ዕቅድ በሁሉም አካባቢዎች በስፋት ጥቅም ላይ እንዲውል ማስተዋወቅና መደገፍ ይኖርባቸዋል።
- የሚመለከታቸው ባለድርሻ አካላት ጥጃ በተወለደ በመጀመሪያዎቹ ስድስት ሰዓታት ውስጥ የእንገር ወተት የመመገብን ወሳኝ ፋይዳ በተመለከተ ግንዛቤ መፍጠርና ስልጠናዎችን መስጠት አለባቸው።
- የእንስሳት ሐኪሞች እና ለእንስሳት ሀብት ልማት ባለሙያዎች ለአርሶ አደሮች እና የእርሻ ስራተኞች ስለ ለጋ ጥጃዎች አያያዝ፣ ስለ ንጽህና አጠባበቅ፣ እንዲሁም ለተባዕትና ለሴት ጥጃዎች እኩል እንክብካቤ ስለማድረግ ስልጠና እንዲያገኙ ማድረግ ይኖርባቸዋል።
- የአካባቢ መስተዳድሮች እና የልማት ድርጅቶች ለአርሶ አደሮች አነስተኛ ወጪ የሚጠይቁና ተግባራዊ የሆኑ ዘዴዎችን በመጠቀም ንጹህ የወሊድ ክፍሎችን፣ ምቹ የመተኛያ ቦታዎችን እና ንጹህ የመመገቢያ ቁሳቁሶችን እንዲያዘጋጁ ድጋፍ ማድረግ ይገባቸዋል።



ሐረማያ ዩኒቨርሲቲ

የምርምር ጉዳዮች ጽ/ቤት

የፖሊሲ መግለጫ 1.3
ግንቦት 2018

የምርምር ትኩረት መስክ

I

በአሳማ እርባታ ዘርፍ የእንስሳት ተላላፊ በሽታዎች ስጋትና ተጋላጭነት፡ በምስራቅ ኢትዮጵያ የተደረገ ጥናት

አደም ሂኮ፣ ፌይሳ አሊዬ፣ አብደላሂ አብዱረህማን እና ሲሳይ ግርማ

የእንስሳት ሕክምና ኮሌጅ፣ ሐረማያ ዩኒቨርሲቲ፣ ሐረማያ፣ ኢትዮጵያ

ቁልፍ መልዕክቶች

- የአሳማ እርባታው ውስጥ ከፍተኛ የሆነ የጨጓራና አንጀት በሽታ አምጪ (enteric zoonosis) ተህዋሲያን ከምችት ተገኝቷል። ከተወሰዱት ናሙናዎች መካከል 27.55% ሳልሞኔላ እንዲሁም 57.14% ኢ-ኮላይ ተገኝቶባቸዋል።
- የዱር አእዋፍ ለብክለቱ መስፋፋት ተጨማሪ ምንጭ መሆናቸው ተረጋግጧል፤ በእነዚህ አእዋፍ ኩስ (fecal) ናሙናዎች ላይ 40% ሳልሞኔላ እና 70% ኢ-ኮላይ ተገኝቷል።
- በ21.43% ናሙናዎች ላይ ሁለቱም ተህዋሲያን በአንድነት የተገኙ ሲሆን፣ ይህም የበሽታው ምንጭ ዘርፈ-ብዙ መሆኑን ያሳያል።
- በእርሻው ሰራተኞች ዘንድ ስለ ዘዋዊት በሽታዎች ያለው ግንዛቤ ዝቅተኛ ሆኖ ተገኝቷል። ከ40% ያነሱ ሰራተኞች ብቻ በብዛት ከሚታዩ የጨጓራና አንጀት ተህዋሲያን ጋር ተያይዘው ስለሚመጡ የጤና ስጋቶች እውቀት እንዳላቸው አሳይተዋል።

መግቢያ

ባለፉት ጥቂት አሥርተ ዓመታት በዓለም ዙሪያ የአሳማ ሥጋ ምርት በከፍተኛ ሁኔታ እየጨመረ መጥቷል፤ ይህም በብዙ የዓለም ክፍሎች ዘመናዊና የተጠናከረ የአሳማ እርባታ እንዲስፋፋ ምክንያት ሆኗል። ይህ አዝማሚያ አነስተኛ ቁጥር ያላቸው ነገር ግን እጅግ ብዙ እንስሳትን በአንድ ላይ የሚያረቡ ግዙፍ ተቋማት እንዲፈጠሩ አድርጓል። የእርባታው መጠን እየጨመረ መሄዱ እና የአስተዳደር ልምዶች ተፈላጊውን ደረጃ አለማሟላታቸው፣ በእሪያ እርባታ ዘርፍ ለበሽታ አምጪ ተህዋሲያን መከሰት ምቹ ሁኔታን ፈጥሯል።

እ.ኤ.አ ከ1985 በፊት በአሳማዎች ላይ ያልታዩ 77 አዳዲስ በሽታ አምጪ ተህዋሲያን ተመዝግበዋል። ከእነዚህም መካከል 39 ቫይረሶች እና 32 የባክቴሪያ ዝርያዎች ይገኛሉ። ከፍተኛ የአሳማ ሥጋ ከሚያመርቱ አገራት መካከል 20 በመቶዎቹ ብቻ ለ82 በመቶው አዳዲስ ተህዋሲያን መከሰት መንስኤ ናቸው። ከእነዚህ በአዲስ ከተለዩት ተህዋሲያን መካከል 30 ያህሉ (39%) ከእንስሳት ወደ ሰው የሚተላለፉ ናቸው። እነዚህ ለውጦች እንደሚያሳዩት፣ በተለይም በቂ የባዮ-ደህንነት (Biosecurity) ጥበቃ በሌለባቸው አካባቢዎች የአሳማ እርባታ ስርጭት መጨመር፣ አዳዲስ የዘዋዊት በሽታዎች እንዲከሰቱና እንዲሰራጩ ከፍተኛ አስተዋጽኦ ሊያደርግ ይችላል።

አብዛኞቹ ከአሳማ ጋር ተያያዥነት ያላቸው የዘዋዊት በሽታ አምጪ ተህዋሲያን የሚተላለፉት ከሰገራ ወደ አፍ በሚደረግ ንክኪ ነው። ምንም እንኳን የኢ-ኮላይ (*E. coli*) ባክቴሪያ በአብዛኛው በእንስሳቱ ላይ ጉዳት የማያደርስ ቢሆንም፣ በአሳማ እርባታ ውስጥ የሌሎች የጨጓራና አንጀት በሽታ አምጪ ተህዋሲያንን መኖር ለመቆጣጠርና ለማረጋገጥ እንደ ዋነኛ አመለካከት ያገለግላል። በተጨማሪም ከአሳማ ሥጋ ጋር የተያያዘ የሳልሞኔላ በሽታ ዋነኛ የሕዝብ ጤና ስጋት ነው። በጥናት የተገኘው ግምት እንደሚያሳየው በሰዎች ላይ ከሚከሰቱት የሳልሞኔላ ህመሞች መካከል ከ1 እስከ 25% የሚሆኑት ምንጫቸው የአሳማ ሥጋ ወይም ከሥጋው የተዘጋጁ ምርቶች ናቸው። ይሁን እንጂ በኢትዮጵያ ውስጥ ይህንን ሁኔታ የሚገልጹ መረጃዎች በጣም ውስን ናቸው። በአሁኑ ወቅት የአሳማ እርባታ በከፍተኛ ሁኔታ እየተስፋፋ ከመምጣቱ እና በባዮ-ደህንነት (biosecurity) ረገድ ያሉ ክፍተቶችን ከግምት ውስጥ በማስገባት፣ በእርሻ ቦታዎች ላይ የሚገኙትን ተህዋሲያን ስርጭት መረዳት የዘዋዊት በሽታዎችን ስጋት ለመቀነስ ወሳኝ ነው።

ስለሆነም የዚህ ጥናት ዋና ዓላማ በሐረማያ ዩኒቨርሲቲ የአሳማ እርባታ ጣቢያ ውስጥ የሚገኙ የጨጓራና አንጅት በሽታ አምጪ ተህዋሲያንን (በተለይም ሳልሞኔላ እና ኢ-ኮላይ) ምንጮችን ለመለየት እና የእርባታ ጣቢያውን የአያያዝ ልምዶች ለመገምገም ነው።

አቀራረቦች እና ውጤቶች

ጥናቱ በሐረማያ ዩኒቨርሲቲ የአሳማ እርባታ ጣቢያ ላይ የተካሄደ ሲሆን፣ አላማዊ ንጥር (Purposive sampling) ተጠቅሟል። ከሁሉም 146 አሳማዎች የሰገራ ናሙና የተወሰደ ሲሆን፣ በተጨማሪም ከመኖሪያ፣ ከመጠጥ ውሃ፣ ከአሳማ ማደሪያዎች፣ ከሰራተኞች መገልገያ፣ ከጽዳት ዕቃዎች እና በእርሻው አካባቢ ከሚገኙ የዱር አእዋፍ ናሙናዎች ተሰብስበዋል። ሁሉም 25 የእርሻ ሰራተኞች የአስተዳደር አሰራሮችን፣ የንፅህና አጠባበቅ ባህሪያትን እና የሳልሞኔላ እና ኢ-ኮላይ የዘፍቲክ አደጋዎችን ግንዛቤ ለመገምገም ጥናት ተደርጎባቸዋል። ናሙናዎች በቀዝቃዛ ሁኔታዎች ውስጥ ወደ የእንስሳት ህክምና ማይክሮባዮሎጂ እና የህዝብ ጤና ባለሙያዎች ከገቡ በኋላ ISO 6579 (2017) ለሳልሞኔላ እና (ISO ፣ 2017; ሂረሽ ፣ 2003) እና ለኢ-ኮላይ በዓለም አቀፍ የጥራት ደረጃዎች መሠረት ምርመራ ተካሂዶባቸዋል። የመጠይቁ መረጃ በአማርኛ እና/ወይም በአፋን ኦሮሞ ተሰብስቧል። የላብራቶሪ እና የዳሰሳ ጥናት መረጃ STATA 14 ን በመጠቀም ተተንተኗል፣ የፒሮሰን ቺ-ካሬ በአደጋ መንስኤዎች ($p < 0.05$) እና በሁለቱ በሽታ አምጪ ተህዋሲያን ($p < 0.01$) መካከል ያለውን የስርጭት ልዩነት ለመፈተሽ ጥቅም ላይ ውሏል።

በሁሉም የናሙና አይነቶች ውስጥ የታየው አጠቃላይ የሳልሞኔላ ስርጭት 27.55% ሲሆን፣ የኢ-ኮላይ ደግሞ 57.14% ሆኖ ተመዝግቧል። ከተመረመሩት የአሳማ የሰገራ ናሙናዎች መካከል 25.34% ሳልሞኔላ እና 50% ኢ-ኮላይ ተገኝቶባቸዋል። ይህም አሳማዎች ራሳቸው ለሁለቱም ተህዋሲያን እንደ ዋነኛ ማጠራቀሚያ ወይም መሸሽጊያ (reservoirs) እንደሚያገለግሉ ያሳያል (ሠንጠረዥ 1)። የሳልሞኔላ ስርጭት በየናሙና ምንጮች መካከል ከፍተኛ ልዩነት አሳሳየም ($p = 0.63$)፤ በአንጻሩ የኢ-ኮላይ ስርጭት እንደ ናሙናው ምንጭ በከፍተኛ ሁኔታ እንደሚለዋወጥ ታይቷል ($p = 0.03$)። ሁለቱ ተህዋሲያን በቀጥታ ሲነጻጸሩ፣ ኢ-ኮላይ ከሳልሞኔላ በበለጠ በሁሉም የናሙና ዘርፎች ውስጥ በከፍተኛ መጠን ተገኝቷል። ይህም ተህዋሲው በአካባቢው ላይ የመቆየት አቅሙ ከፍተኛ መሆኑን እና በእርሻው ውስጥ በሰፊው መሰራጨቱን ያረጋግጣል።

ከአካባቢ ናሙናዎች መካከል በ31.75% ላይ ሳልሞኔላ ሲገኝ፣ በ68.25% ላይ ደግሞ ኢ-ኮላይ ተገኝቷል። እነዚህም የአሳማ መኖሪያ ቤቶችን፣ ወለሎችን፣ የአትክልት ስፍራ አፈርን፣ የሰራተኞች ቦት ጫማዎችን እና የተለያዩ የመገልገያ ቁሳቁሶችን ገጽታ ያካተቱ ናቸው (ሠንጠረዥ 1)።

ምንም እንኳን ሳልሞኔላ በሰራተኞች አፕሮን (መከለያ ልብስ) እና በጽዳት ብሩሾች ላይ ባይገኝም፣ ኢ-ኮላይ ግን በእነዚህ ቁሳቁሶች ላይ ተገኝቷል። ይህም ተህዋሲያኑ ከቦታ ቦታ ለመሰራጨታቸው ከሰው ጋር የተያያዙ መንገዶች ከፍተኛ አስተዋጽኦ እንዳላቸው ይጠቁማል።

ሠንጠረዥ 1: የሳልሞኔላ እና ኢ-ኮላይ በናሙና ምንጭ ላይ መገኘት

የናሙና አመጣጥ	የተመረመረ ናሙና ቁጥር	ቁጥር (%) አምስታዊ ለ		χ^2 **	p-Value **
		ሳልሞኔላ	ኢ ኮላይ		
አሳማዎች	146	37 (25.34)	73 (50.00)	18.90	<0.001
ምግብ እና የመጠጥ ውሃ	85	24 (28.24)	52 (61.18)	18.66	<0.001
አካባቢ	63	20 (31.75)	43 (68.25)	16.79	<0.001
አጠቃላይ	294	81 (27.55)	168 (57.14)	52.73	<0.001
χ^2 *		0.93	6.78		
p- value *		0.63	0.03		

* በ 95% አስተማማኝነት ከፍተኛ; ** በ 99% አስተማማኝነት ከፍተኛ በ ሳልሞኔላ እና በኢ-ኮላይማገለል መካከል በሚታሰበው የአደጋ መንስኤ ውስጥ።

የእንስሳቱ መኖ እና የመጠጥ ውሃ ብክለት የታየባቸው ሲሆን፤ ሳልሞኔላ ከ17.95–36.96% በሚሆኑ ናሙናዎች ላይ፤ ኢ-ኮላይ ደግሞ ከ50–74.40% በሚሆኑ ናሙናዎች ላይ ተገኝቷል። ይህም መኖና ውሃ ለአሳማዎቹ ዋነኛ የበሽታ መግኛ ምንጮች መሆናቸውን ያረጋግጣል። የዱር እንስሳት ንክኪ ሌላኛው አሳሳቢ ግኝት ሆኖ ተመዝግቧል። ወደ እርሻው ጣቢያ ከሚመጡ የዱር አእዋፍ በተወሰዱ የሰገራ ናሙናዎች ውስጥ፡- 40% ሳልሞኔላ እና 70% ኢ-ኮላይ ተገኝቷል። ይህ ግኝት 92% የሚሆኑት ሰራተኞች በእርሻው ውስጥ የአእዋፍ ዝውውርን ለመቆጣጠር የሚያስችል ምንም ዓይነት መከላከያ እንደሌለ ከሰጡት ምላሽ ጋር በቀጥታ ይጣጣማል። በተጨማሪም በ21.43% ናሙናዎች ላይ ሁለቱም ተህዋሲያን (ሳልሞኔላ እና ኢ-ኮላይ) በአንድ ላይ ተገኝተዋል። ይህም ብክለቱ የተደራራቢ መንገዶች ውጤት መሆኑን እና ተህዋሲያኑ በተለያዩ የናሙና አይነቶች፤ በአካባቢው እና በእንስሳት ቡድኖች መካከል በተወሰነበ ሁኔታ እንደሚዘዋወሩ ያሳያል።

ተጨማሪ ትንታኔዎች እንደሚያሳዩት፤ የተህዋሲያኑ ብክለት መጠን እንደ አሳማ ማደሪያ ክፍሎቹ ይለያያል። ስምንት የአሳማ ማደሪያ ቤቶች ባሉበት በዚህ እርሻ ውስጥ፤ በሰባቱ ቤቶች ውስጥ የሳልሞኔላ ስርጭት ከ18.84% እስከ 40% ደርሷል። አንጻሩ አንዱ ማደሪያ ቤት ከሳልሞኔላ ነፃ ሆኖ ተገኝቷል። በአንጻሩ ኢ-ኮላይ በሁሉም ስምንቱም ማደሪያ ቤቶች ውስጥ በተገኙ አሳማዎች ላይ የታየ ሲሆን፤ የስርጭት መጠኑም ከ49.30% እስከ 80.00% ይደርሳል።

የአያያዝ ልምዶችና የሰራተኞች ባህሪ መረጃዎች በላቦራቶሪ የተገኘውን የማይክሮባዮሎጂ ውጤት ይበልጥ ያብራራሉ። ምንም እንኳን 84% የሚሆኑት ሰራተኞች አሳማዎቹን በተለያዩ ቤቶች እንደሚለዩ እና 72% የሚሆኑት ደግሞ የእንስሳት ሕክምና አገልግሎት እንደሚገኙ ቢገልጹም፤ በሌሎች ወሳኝ የንጽህና ተግባራት ላይ ከፍተኛ ክፍተቶች ታይተዋል፡- 80% የሚሆኑት ምላሽ ሰጪዎች አይጥና ነፍሳትን ለመቆጣጠር የሚደረግ ምንም ዓይነት ጥረት እንደሌለ ገልጸዋል። 60% የሚሆኑት በእርሻው ውስጥ ብቻ የሚያገለግል የተለየ ጫማ እንደማይጠቀሙ ሲናገሩ፤ 68% የሚሆኑት ደግሞ ወደ አሳማዎቹ መኖሪያ ከመግባታቸው በፊት እጃቸውን እንደማይታጠቡ ወይም የእግር መታጠቢያ እንደማይጠቀሙ ገልጸዋል። ስለ ዞኖቲክ በሽታዎች (ከእንስሳት ወደ ሰው ስለሚተላለፉ በሽታዎች) ያለው እውቀት እጅግ ዝቅተኛ ነው። 28% የሚሆኑት ብቻ ስለ ሳልሞኔላ፤ 36% ደግሞ ስለ ኢ-ኮላይ ከእንስሳት ወደ ሰው የመተላለፍ ዕድል ግንዛቤ አላቸው።

ጥናቱ የደረሰባቸው የተለያዩ ማስረጃዎች ማለትም የተህዋሲያኑ ስርጭት፤ የአካባቢ ብክለት ሁኔታ፤ የዱር እንስሳት ተሳትፎ እና የሰራተኞች የአያያዝ ልምድ በአንድ ላይ ሲታዩ፤ እርሻው በሽታ አምጪ ተህዋሲያን በአሳማዎች፤ በሰዎች እና በአካባቢው መካከል እንዲቆዩና እንዲዘዋወሩ የሚያስችል ከፍተኛ ስጋት ያለበት ሥነ-ምህዳር መሆኑን ያሳያሉ። የመኖ፤ የውሃ፤ የእንስሳት ንክኪ ያላቸው ንጣፎች እና የዱር እንስሳት መሸሽጊያዎች መበከል እንደሚያሳዩት፤ ተህዋሲያኑን ለመቆጣጠር በአሳማዎቹ ላይ ብቻ ማተኮር በቂ አይደለም። ይልቁንም በርካታ የበሽታ መተላለፊያ ነጥቦችን ያነጣጠረ ጣልቃ ገብነት ያስፈልጋል።

ጥናቱ እንደሚያረጋግጠው፤ በሐረማያ ዩኒቨርሲቲ የአሳማ እርባታ ጣቢያ ውስጥ በአሳማዎች፤ በመኖ፤ በውሃ፤ በአካባቢ ንጣፎች እና በዱር እንስሳት ላይ የተንሰራፋ የሳልሞኔላ እና የኢ-ኮላይ ብክለት ይገኛል። ለዚህም ዋነኛው መንስኤ ያልተሟላ የባዮ-ደህንነት ጥበቃ፤ ወጥ ያልሆነ የሰራተኞች ንጽህና አጠባበቅ እንዲሁም የዱር አእዋፍና አይጦችን ለመቆጣጠር የሚደረገው ጥረት አነስተኛ መሆኑ ነው። የኢ-ኮላይ ስርጭት በከፍተኛ ሁኔታ መገኘቱ ተህዋሲው በአካባቢው ላይ የመቆየትና የመቋቋም አቅሙ ከፍተኛ መሆኑን ያሳያል። በተጨማሪም ሁለቱም ተህዋሲያን በተለያዩ የናሙና አይነቶች ውስጥ በአንድ ላይ መገኘታቸው በእርሻው ውስጥ ያለው የበሽታ መተላለፊያ መንገድ እጅግ የተወሰነበ መሆኑን ያረጋግጣል።

የፖሊሲ ምክሮች

- የግብርና ሚኒስቴር እና የእንስሳት ጤና ኢንስቲትዩት የሳልሞኔላ እና የኢ-ኮላይ ስርጭትን ለመቀነስ መሰረታዊ የእርሻ ንጽህና አጠባበቅ እና የባዮ-ደህንነት ስርአቶችን ማጠናከር ይኖርባቸዋል።
- የአሳማ እርባታ ጣቢያዎች ከመኖ፤ ከውሃ እና ከእንስሳቱ መኖሪያ አካባቢ የሚመጣን ብክለት ለመገደብ መደበኛ የጽዳት መርሃ-ግብር እና ቀላል የአካባቢ ቁጥጥር ዘዴዎችን ተግባራዊ ማድረግ አለባቸው።
- የእርሻ ባለቤቶች የዱር አእዋፍ እና አይጦች ወደ አሳማ እርባታ ጣቢያው እንዳይገቡ የሚከለክሉ ስልቶችን መጠቀምን ከግምት ውስጥ ማስገባት ይኖርባቸዋል።
- የእንስሳት ሐኪሞች ለሰራተኞች ከእንስሳት ወደ ሰው ስለሚተላለፉ በሽታዎች እና ስለ አስፈላጊ የንጽህና ልምዶች ግንዛቤ መፍጠርና ተግባራዊ ስልጠናዎችን መስጠት አለባቸው።



ሐረማያ ዩኒቨርሲቲ

የምርምር ጉዳዮች ጽ/ቤት

የፖሊሲ መግለጫ 2.1
ግንቦት 2018

የምርምር ትኩረት
መስክ

II

በምስራቅ ኢትዮጵያ ያለሃኪም ትዕዛዝ የሚደረግ ሰፊ የአንቲባዮቲክ መድኃኒቶች አቅርቦት እና የተሳሳተ አጠቃቀም፡- በሕብረተሰብ ጤና ላይ የተጋረጠ እየተባባሰ የመጣ ስጋት

ዱሜሳ እዴሳ^{1, 2}፣ ፈቀደ አሰፋ^{2, 3}፣ ግርማዬ ዲንሳ^{2, 4}፣ እና ለሜሳ አልጂራ²

¹የፋርማሲ ትምህርት ቤት፣ የጤናና ሕክምና ሳይንስ ኮሌጅ፣ ሐረማያ ዩኒቨርሲቲ፣ የፖ.ሣ.ቁ. 235፣ ሐረር፣ ኢትዮጵያ።

²የሕዝብ ጤና ጥበቃ ትምህርት ቤት፣ የጤናና ሕክምና ሳይንስ ኮሌጅ፣ ሐረማያ ዩኒቨርሲቲ፣ ሐረር፣ ኢትዮጵያ።

³የቴክኒክ ዩኒቨርሲቲ የጤና ሳይንስ ማዕከል - አክ ሪጅ ብሔራዊ ላቦራቶሪ (UTHSC-ORNL) የባዮሜዲካል ኢንፎርማቲክስ ማዕከል፣ የሕፃናት ሕክምና ትምህርት ክፍል፣ የሕክምና ኮሌጅ፣ ሜምፊስ ቴክኒክ፣ አሜሪካ።

⁴ፍኖት ፕሮጀክት፣ የዓለም አቀፍ ጤና እና የሕዝብ ቁጥር ትምህርት ክፍል፣ የሃርቫርድ ቴክኒካል ሽግግር የሕዝብ ጤና ጥበቃ ትምህርት ቤት፣ አዲስ አበባ፣ ኢትዮጵያ።

ቁልፍ መልዕክቶች

- በቅርብ ጊዜ አንቲባዮቲክ ከተጠቀሙ ሰዎች መካከል 45% ያህሉ ያለአግባብ (ያለ ሕኪም ትዕዛዝ) ያገኙ ሲሆን፣ 51% የሚሆኑት ደግሞ ሳያስፈልግ አንቲባዮቲክን ተጠቅመዋል።
- ከሌሎች የዕድሜ ክልሎች ጋር ሲነጻጸር፣ ዕድሜያቸው ከአምስት ዓመት በታች የሆኑ ሕፃናት ለተገቢ ያልሆነ የአንቲባዮቲክ አጠቃቀም የመጋለጥ ዕድላቸው በ1.48 እጥፍ ከፍ ያለ ነው።
- የገጠር ነዋሪዎች ከከተማ ነዋሪዎች ይልቅ አንቲባዮቲክን ያለአግባብ የመጠቀም እድላቸው በ26% ይበልጣል።
- መደበኛ ትምህርት ያልተማሩ እና የመጀመሪያ ደረጃ ትምህርት ያጠናቀቁ ግለሰቦች አንቲባዮቲክን ሳያስፈልግ የመጠቀም እድላቸው በ34% ይጨምራል።
- ኪዮስኮች (ሰቆች) እና የመድኃኒት መሸጫ ቤቶች ያለ ሕኪም ትዕዛዝ ለሚሰራጩ አንቲባዮቲኮች ዋነኛ ምንጮች ሲሆኑ፣ በተለይም ኪዮስኮች ለ32% ከፍ ያለ የአጠቃቀም ስህተት ስጋት መንስኤ መሆናቸው ተገልጿል።

መግቢያ

ባለፉት ሁለት አስርት ዓመታት ውስጥ በዓለም አቀፍ ደረጃ የአንቲባዮቲክ መድኃኒቶች አጠቃቀም በ46 በመቶ የጨመረ ሲሆን፣ በተለይም የኮሮና ቫይረስ (ኮቪድ-19) ወረርሽኝ ከተከሰተ ወዲህ ከፍተኛ ጭማሪ ታይቷል። ምንም እንኳን አንቲባዮቲኮች በባክቴሪያ የሚመጡ ኢንፌክሽኖችን ለመከላከልና ለማከም አስፈላጊ ቢሆኑም፣ ውስን ሀብት ባላቸው አገራት ውስጥ የሚደረገው አጠቃቀም ግን በአብዛኛው አላስፈላጊ ሊሆን ይችላል። ጥናቶች እንደሚያመለክቱት ለከባድ የላይኛው የመተንፈሻ አካላት ሕመም ከሚወሰዱ አንቲባዮቲኮች መካከል ከ50 በመቶ በላይ የሚሆኑት አላስፈላጊ ናቸው።

እንዲሁም ስልታዊ ግምገማዎች እንደሚያሳዩት በራሳቸው ጊዜ ሊድኑ የሚችሉ ከ40 በመቶ በላይ የሚሆኑ በሽታዎች ያለ በቂ ምክንያት በአንቲባዮቲክ ይታከማሉ። አላስፈላጊ የአንቲባዮቲክ አጠቃቀም ለፀረ-ተህዋስያን መድኃኒቶች መላመድ ዋነኛው ምክንያት ሲሆን፣ ይህም በ2019 እ.ኤ.አ በዓለም አቀፍ ደረጃ ለ1.27 ሚሊዮን ሰዎች ሞት ቀጥተኛ ምክንያት ሆኗል፤ እንዲሁም ለተጨማሪ 4.95 ሚሊዮን ሰዎች ሞት አስተዋጽኦ አድርጓል።

ጥንቃቄ የተሞላበት የአንቲባዮቲክ አጠቃቀምን የሚደግፉ ዓለም አቀፍ ጥረቶች ቢኖሩም፤ አሁንም አፍሪካ ከፍተኛውን በፀረ-ተህዋስያን መድኃኒቶች መላመድ ምክንያት የሚከሰት የሞት መጠን እያስመዘገበች ትገኛለች። የዓለም ጤና ድርጅት በማህበረሰብ ደረጃ በሚደረግ የአንቲባዮቲክ አጠቃቀም ላይ ለሚሰሩ ምርምሮች ቅድሚያ የሰጠ ሲሆን፤ ኢትዮጵያም በክትትልና በጥናቶች አማካኝነት መረጃዎችን ለማጠናከር ቃል ገብታለች። በኢትዮጵያ ውስጥ የመድኃኒት አቅርቦቶች ታካሚዎች አንቲባዮቲኮችን በኃላፊነት ስሜት እንዲጠቀሙ የመምከር ሚና ቢጠበቅባቸውም፤ ያለ ሐኪም ትዕዛዝ (prescription)፤ ፈቃድ ከሌላቸው ምንጮች ጭምር መድኃኒቶቹን የማግኘትና ያለ አግባብ የመጠቀም ልምድ እየተስፋፋ ይገኛል። እስካሁን ድረስ የአንቲባዮቲክ አጠቃቀም ቁጥጥርና የክትትል ጥረቶች በጤና ተቋማት ላይ ብቻ የተገደቡ በመሆናቸው፤ በማህበረሰቡ ደረጃ ያለውን ልምድ ትኩረት ሳይሰጡት ቆይተዋል። ስለሆነም ይህ በማህበረሰብ ላይ የተመሠረተ ጥናት የአንቲባዮቲክ አጠቃቀም ባህሪን ከተጠቃሚዎች እይታ አንጻር በመመርመር እነዚህን ክፍተቶች የሚሞላ ሲሆን፤ ለሁኔታው ተስማሚ የሆኑ የክትትል ስልቶችን ለመቅረጽ የሚያስችል መረጃ ያቀርባል።

አቀራረቦች እና ውጤቶች

በሐረማያ ገጠራማ አካባቢዎች እና በሐረር ከተማ ውስጥ በንብርብር የክላስተር ናሙና አመራረጥ (stratified cluster sampling) የተመረጡ 2,256 አባወራዎችን/አማወራዎችን ያሳተፈ በማህበረሰብ ላይ የተመሠረተ አቋራጭ/የመስቀለኛ ጥናት ተካሂዷል። የአንቲባዮቲክ አቅርቦት ያለ ሐኪም ትዕዛዝ ወይም ፈቃድ ከሌላቸው ምንጮች የተገኘ ከሆነ እንደ "ተገቢ ያልሆነ አቅርቦት" ተቆጥሯል። "አላስፈላጊ የአንቲባዮቲክ አጠቃቀም" የሚለው ቃል ባክቴሪያዊ ላልሆኑ ኢንፌክሽኖች (ለምሳሌ ለጉንፋን እና ለኢንፍሉዌንሻ) ወይም ሁልጊዜ አንቲባዮቲክ ለማያስፈልጋቸው የባክቴሪያ ኢንፌክሽኖች ጥቅም ላይ መዋልን ያመለክታል። የአንቲባዮቲክ አጠቃቀም አስፈላጊነት የተመዘነው በዓለም አቀፍ የበሽታዎች ምደባ (ICD-10-CM) ላይ ተመስርቶ በታተመ የአንቲባዮቲክ አስፈላጊነት ምደባ መርሃ ግብር ሲሆን፤ አጠቃቀሙ ትክክለኛ ካልሆኑ የምርመራ ኮዶች ጋር የተያያዘ ከሆነ እንደ "አላስፈላጊ" ተመዝግቧል። ተገቢ ያልሆነ የአንቲባዮቲክ አቅርቦት እና አላስፈላጊ አጠቃቀምን የሚወስኑ ሁኔታዎች ተገቢ የሆኑ የስታቲስቲክስ ሞዴሎችን በመጠቀም ተለይተዋል።

ሠንጠረዥ 1፡- የጥናቱ ተሳታፊዎች የማህበራዊ እና ስነ-ሕዝባዊ ባህሪያት፤ ምስራቅ ኢትዮጵያ፡ 2023

ባህሪያት	ምድቦች	ቁጥር (%) (ጠቅላላ = 2,256))
የምላሽ ሰጪው ዕድሜ (በዓመት)	< 20	123 (5.5)
	20-39	1350 (59.8)
	40-59	573 (25.4)
	≥ 60	210 (9.3)
የምላሽ ሰጪው ጾታ	ወንድ	366 (16.2)
	ሴት	1890 (83.8)
የጋብቻ ሁኔታ	ፈጽሞ ያላገባ/ች	191 (8.5)
	ያገባ/ች	1803 (79.9)
	የትዳር አጋር የሞተበት/ባት	185 (8.2)
	የተፋታ/ች ወይም የተለየ/ች	77 (3.4)
የትምህርት ደረጃ	መደበኛ ትምህርት	1026 (45.5)
	የሌለው/ላት	
	አንደኛ ደረጃ	685 (30.4)
	ሁለተኛ ደረጃ	319 (14.1)
	ከፍተኛ ትምህርት	226 (10.0)
የሥራ ሁኔታ	ሥራ የሌለው/ላት ወይም ተማሪ	195 (8.6)
	አርሶ አደር	529 (23.5)
	የቤት እመቤት	1053 (46.7)
	ተቀጣሪ ሰራተኛ	237 (10.5)
	ነጋዴ	165 (7.3)
	ሌሎች*	77 (3.4)
	ገጠር	1381 (61.2)
	ከተማ	875 (38.8)
የቤተሰቡ የማህበረሰብ አቀፍ የጤና መድሃኒት አባልነት	አዎ	1696 (75.2)
	የለም	560 (24.8)

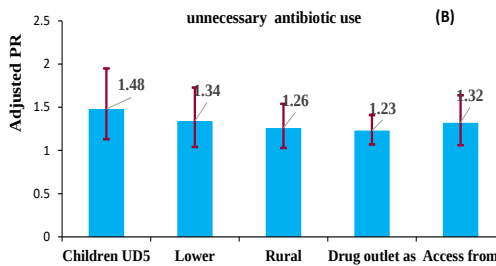
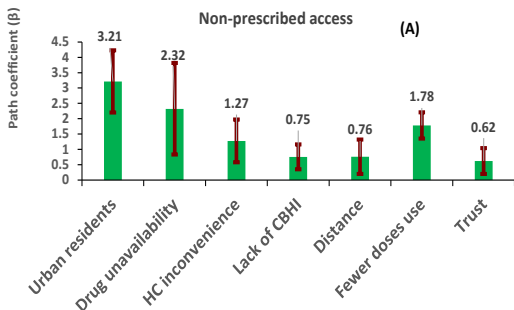
ሌሎች*፡- የዕለት ጉልበት ሥራ፣ ሹፌር እና የሙያ (ቴክኒክ) ሥራዎችን ያጠቃልላል።

አብዛኞቹ ምላሽ ሰጪዎች ሴቶች (83.8%)፣ በ20-39 የዕድሜ ክልል ውስጥ የሚገኙ (59.8%)፣ ያገቡ (79.9%) እና የገጠር ነዋሪዎች (61%) ነበሩ። ከግማሽ የሚጠጉት መደበኛ ትምህርት ያልተማሩ (45.5%) እና የቤት እመቤቶች (46.7%) ናቸው (ሠንጠረዥ 1)።

ከቅርብ ጊዜ ወዲህ አንቲባዮቲክ ከወሰዱ 1,245 ግለሰቦች መካከል፣ 567 (45.6%) የሚሆኑት መድኃኒቱን ያገኙት ተገቢ ባልሆነ መንገድ ሲሆን፣ 636 (51.1%) የሚሆኑት ደግሞ ያለ አግባብ (አሳስፈላጊ ለሆነ ሁኔታ) ተጠቅመውታል። መድኃኒቶችን ያለ ሐኪም ትዕዛዝ የማግኘት ሁኔታ በከተማ ነዋሪዎች ዘንድ በሦስት እጥፍ ($\beta = 3.21$) ብልጫ አለው፤ በተጨማሪም በመንግሥት ጤና ተቋማት ውስጥ የሚፈለጉ መድኃኒቶች አለመኖር ($\beta = 2.32$) ፣ በጤና አገልግሎት አሰጣጥ ላይ የሚታይ ምኞት ማጣት ($\beta = 1.27$) እና

የማህበረሰብ አቀፍ የጤና መድሀኒት አለመኖር ($\beta = 0.75$) ተገቢ ያልሆነ አንቲባዮቲክስ የማግኘት ዕድልን እንዲጨምር ከሚያደርጉ ምክንያቶች ጋር የተቆራኙ ሆነው ተገኝተዋል።

በተጨማሪም መድኃኒቶችን ፈቃድ ከሌላቸው ምንጮች የማግኘት ሁኔታ በገጠር ነዋሪዎች ዘንድ በሁለት እጥፍ ($\beta = 2.14$) የሚበልጥ ሲሆን፣ በሴቶች ዘንድም ($\beta = 1.15$) የተለመደ ሆኖ ተገኝቷል። ዕድሜያቸው ከአምስት ዓመት በታች የሆኑ ሕፃናት በ48% (APR: 1.48) ፣ የገጠር ነዋሪዎች በ26% (APR: 1.26) ፣ ዝቅተኛ የትምህርት ደረጃ ያላቸው ግለሰቦች በ34% (APR: 1.34) እና አንቲባዮቲኮችን ከሱቆች የሚገዙ ሰዎች በ32% (APR: 1.32) አሳስፈላጊ የአንቲባዮቲክ አጠቃቀም የመፈጸም ዕድላቸው ከፍተኛ መሆኑ ተመዝግቧል (ምስል 1)።



ምስል 1: (ሀ) ያለ ሐኪም ትዕዛዝ የሚደረግ የአንቲባዮቲክ አቅርቦት ልምዶች ላይ ተጽዕኖ የሚያሳድሩ ሁኔታዎች እና (ለ) አሳስፈላጊ የአንቲባዮቲክ አጠቃቀም ልምዶችን የሚወስኑ ሁኔታዎች በጥናቱ ተሳታፊዎች ዘንድ፣ ምስራቅ ኢትዮጵያ፣ 2023።

የፖሊሲ ምክሮች

- የጤና ሚኒስቴር እና የክልል ጤና ቢሮዎች በአንቲባዮቲክ አጠቃቀም ቁጥጥርና ከትትል ጥረቶችን በማህበረሰብ ደረጃ ያሉ እንደ መድኃኒት መሸጫ ቤቶች እና የመጀመሪያ ደረጃ ጤና ጣቢያዎችን እንዲያካትቱ ማስፋፋት አለባቸው።
- የኢትዮጵያ የምግብና መድኃኒት ባለሥልጣን እና ሌሎች የሚመለከታቸው አካላት አንቲባዮቲኮች በሐኪም ትዕዛዝ ብቻ እንዲሰጡ የሚያዘዘውን ደንብ በጥብቅ መተግበር እና ፈቃድ የሌላቸውን የመድኃኒት ሽያጮች መከልከል

ይኖርባቸዋል። በተለይም ሕገ-ወጥ የሆኑ የመድኃኒት አቅርቦቶች በስፋት በሚታዩባቸው የገጠር አካባቢዎች ላይ ትኩረት ማድረግ ያስፈልጋል።

- የጤና ሚኒስቴር እና የአካባቢው የጤና ባለሥልጣናት አሳስፈላጊ የአንቲባዮቲክ አጠቃቀምን ለመቀነስ ለገጠር ማህበረሰቦች፣ ለሴቶች፣ ለሕፃናት እና ለድካሞች እና ውስን የትምህርት ደረጃ ላላቸው ግለሰቦች የተዘጋጁ ልዩ የግንዛቤ ማስጨበጫ መርሃ ግብሮችን ማቅረብ አለባቸው።



ሐረማያ ዩኒቨርሲቲ

የምርምር ጉዳዮች ጽ/ቤት

የፖሊሲ መግለጫ 2.2
ግንቦት 2018

የምርምር ትኩረት
መስክ

II

ውስን ሀብት ባላቸው አካባቢዎች የወሊድ መከላከያ አጠቃቀምን ማሳደግ፣ ከባህላዊ እሴቶች ጋር የተጣጣሙ የመፍትሄ እርምጃዎችን መተግበር

ታሪኩ ድንገታ፣ ገላና ማሞ፣ ዓለማየሁ ዴሬሳ፣ መሐመድ ዩዖ እና ታራ ዊልፎንግ

የጤናና ሕክምና ሳይንስ ኮሌጅ፣ ሐረማያ ዩኒቨርሲቲ፣ ሐረር፣ ኢትዮጵያ

ቁልፍ መልዕክቶች

- በዑደታዊ ዶቃዎች የታገዘ የመደበኛ ቀናት ዘዴ (ኤስዲኤም) ተግባራዊ ከሆነ በኋላ፣ የወሊድ መከላከያ ተጠቃሚነት ከነበረበት 28.9% ወደ 64.5% አድጓል።
- በዑደታዊ ዶቃዎች የታገዘ የመደበኛ ቀናት ዘዴ አማካኝነት የወንዶች ተሳትፎ እና በጥንዶች መካከል ያለው ግልጽ ውይይት ከ 14% ወደ 66.1% በከፍተኛ ሁኔታ መሻሻል አሳይቷል።
- የሴቶች መደበኛ ትምህርት፣ ለወሊድ መከላከያ ያላቸው አምነታዊ አመለካከት፣ ከፍተኛ የግል በራስ መተማመን እና ንቁ የወንዶች ተሳትፎ ለወሊድ መከላከያ አጠቃቀም ዕድገት ዋነኛ መንስኤዎች ሆነው ተገኝተዋል።

መግቢያ

ዝቅተኛና መካከለኛ ገቢ ባላቸው አገራት ውስጥ በየዓመቱ ዕድሜያቸው ከ15-19 የሆኑ 12 ሚሊዮን የሚጠጉ ልጃገረዶች እና ዕድሜያቸው ከ15 ዓመት በታች የሆኑ ከ777,000 በላይ ልጃገረዶች ይወልዳሉ። ከእርግዝና ጋር የተያያዙ ችግሮች ከ15-19 ዓመት ለሆኑ ልጃገረዶች ዋነኛ የሞት መንስኤ ናቸው። የእርግዝና መከላከያ ያልተፈለገ እርግዝናን ለመቀነስ እንዲሁም የእናቶችንና የህፃናትን ጤና ለማሻሻል በጣም ውጤታማው ስልት ሲሆን፤ ይህም የረጅም ጊዜ መከላከያዎችንና ስለ ፅንሰ መራባት ያለ ግንዛቤ ላይ የተመሰረቱ ዘዴዎችን ጨምሮ የተለያዩ አማራጮችን ያቀርባል። በፅንሰ መራባት ያለ ግንዛቤ ላይ የተመሰረቱ ዘዴዎች ለምሳሌ እንደ በዑደታዊ ዶቃዎች የታገዘ የመደበኛ ቀናት (ኤስዲኤም) ያሉ ሴቶች በመደበኛ የወር አበባ ዑደት ውስጥ የሚገኙትን ለፅንሰ ዝግጁ የሆኑ ቀናትን (ከቀን 8-19) እንዲለዩ እና ግንኙነት ባለማድረግ ወይም በሌሎች መከላከያዎች እርግዝናን እንዲከላከሉ ያስችላቸዋል።

እ.ኤ.አ. በ2001 የተገነባው እንደ የወር አበባ ዑደት መከታተያ ዕንቁዎች ወይም “ሳይክል ቢድስ” ያሉ መሣሪያዎች ሴቶች የመራባት ምልክቶቻቸውን በቀላሉ እንዲከታተሉ እና ዘዴውን በትክክል እንዲጠቀሙ ይረዳሉ።

ከሰሃራ በታች ባለው የአፍሪካ ክፍል ከግማሽ በላይ የሚሆነው የህዝብ ቁጥር ልጃገረዶች ሲሆኑ፤ አብዛኛዎቹም ዕድሜያቸው 18 ሳይሞላ ይጋባሉ። ይህም ያለ ዕድሜ እናትነት እና ያልተፈለገ እርግዝና የእናቶችንና የህፃናትን ሞት ጨምሮ ከፍተኛ የጤና ችግሮችን ያስከትላል። ይህ ቢሆንም፣ በተለይም በገጠር አካባቢዎች የተሳሳቱ አመለካከቶች፣ የጎንዮሽ ጉዳዮች ፍራቻ፣ ውስን እውቀት እና የትዳር አጋር አለመስማማት ምክንያት የእርግዝና መከላከያ አጠቃቀም ዝቅተኛ ሆኖ ይገኛል። እንደ መደበኛ ቀናት (ኤስዲኤም) እና ሳይክል ቢድስ ያሉ ዘዴዎችን በማህበረሰብ ደረጃ ማስተዋወቅ፣ ፍላጎትን ለመጨመር፣ በጥንዶች መካከል ያለውን ግንኙነት ለማሻሻል እና የተሳሳቱ አመለካከቶችን ለማጥፋት ተስፋ ሰጪ ውጤቶችን አሳይቷል። ሆኖም ግን፣ ዝቅተኛ የትምህርት ደረጃ ባላቸው እና በገጠር በሚኖሩ ሴቶች ዘንድ አሁንም የአጠቃቀም መጠኑ ዝቅተኛ ነው።

እነዚህን መሰናክሎች ከግምት ውስጥ በማስገባት፣ እንደ መደበኛ ቀናት ዘዴ (ኤስዲኤም) ያሉ በፅንሰ መራባት ግንዛቤ ላይ የተመሰረቱ ዘዴዎች ከሆርሞን ወይም ከሌሎች የቀዶ ጥገና ጣልቃ ገብነት ከሚጠይቁ ዘዴዎች ይልቅ ቀላል እና የጎንዮሽ ጉዳት የሌላቸው አማራጮች ናቸው። በባህላዊ መልኩ ተቀባይነት ያላቸውን እና ርካሽ የሆኑ እንደ ሳይክል ቢድስ ያሉ ዘዴዎችን በጤና ኤክስቴንሽን ባለሙያዎች በሚመሩ የማህበረሰብ ጤና አገልግሎቶች ውስጥ ማካተት፣ ዘዴዎቹ ተቀባይነት እንዲያገኙ እና በትክክል ስራ ላይ እንዲውሉ ለማድረግ ይረዳል።

ይህ አቀራረብ የእርግዝና መከላከያ አማራጮችን ለማስፋት፣ ያልተፈለገ እርግዝናን ለመቀነስ እና በመጨረሻም በኢትዮጵያ መሰል ሁኔታዎች ውስጥ በሚገኙ ወጣት ሴቶች ዘንድ የእናቶችንና የህፃናትን ጤና ለማሻሻል ያለመ ነው።

አቀራረቦች እና ውጤቶች

ጥናቱ የሳይክሊኒክ ቢድስ የተቀላቀለበትን እንደ መደበኛ ቀናት ዘዴ (ኤስዲኤም) ጣልቃ-ገብነት ውጤታማነት ለመገምገም በከፊል-መከራ ንድፍ ተጠቅሟል። ጥናቱ በምስራቅ ኢትዮጵያ በቀርሳ ወረዳ ከጥር እስከ ነሐሴ 2015 ዓ.ም ተካሂዷል። በድምሩ 330 ወጣት ባለትዳር ሴቶች (165 በመከረት ቡድን (experimental group) እና 165 በቀራኛ ቡድን (control group) ውስጥ በቀርሳ የስነ-ህዝብ ክትትል እና ጤና ምርምር ማዕከል ውስጥ ከሚገኙ ቀበሌዎች በነሲብ ናሙና ተመርጠዋል። ጣልቃ-ገብነቱ በሰለጠኑ የጤና ኤክስቴንሽን ባለሙያዎች የቀረበ ሲሆን፣ እነሱም ስለ ሳይክሊኒክ ቢድስ አጠቃቀም እና ስለ መደበኛ ቀናት ዘዴ (ኤስዲኤም) የምክር አገልግሎትና ትምህርት ሰጥተዋል። የትምህርቱ ክፍለ-ጊዜዎች የወር አበባ ዑደትን በመከታተል፣ ለፅንሰ ዝግጁ የሆኑ ቀናትን በመለየት እና በእነዚህ ቀናት ግንኙነትን በመገደብ ወይም ሌሎች መከላከያዎችን በመጠቀም እርግዝናን የመቆጣጠር ስልቶች ላይ አተኩረዋል። ጣልቃ-ገብነቱ በጥንዶች መካከል ያለውን ግንኙነት ለማሻሻል፣ የጾታ እኩልነትን ለማበረታታት እና ስለ እርግዝና መከላከያ ያሉ የተሳሳቱ አመለካከቶችን ለማጥፋት የቤት ለቤት ጉብኝቶችን አካቷል። የጤና ኤክስቴንሽን ባለሙያዎች ባህልን ያከበረ የምክር አገልግሎት እንዲሰጡ እና ወንዶች በእርግዝና መከላከያ ውሳኔዎች ላይ እንዲሳተፉ ለማበረታታት ስልጠና ተሰጥቷቸዋል። መረጃዎች የተሰበሰቡት ጥናቱ ከመጀመሩ በፊት፣ ከስድስት ወራት በኋላ እና ከአስራ ሁለት ወራት በኋላ በተዘጋጁ መጠይቆች፣ በቡድን ውይይቶች እና ጥልቅ ቃለ-መጠይቆች አማካኝነት ነው።

ጣልቃ-ገብነቱ በጥናቱ ተሳታፊዎች ዘንድ የእርግዝና መከላከያ አጠቃቀምን በከፍተኛ ደረጃ እንዲጨምር አድርጓል። ጥናቱ ከመጀመሩ በፊት (መነሻ ደረጃ) ማንኛውንም ዓይነት የእርግዝና መከላከያ ዘዴ እንደሚጠቀሙ ሪፖርት ያደረጉት ሴቶች 28.9% ብቻ ነበሩ። በሳይክሊኒክ ቢድስ የታገዘው የመደበኛ ቀናት ዘዴ (ኤስዲኤም) ከቀረበ በኋላ ግን፣ የመከላከያ አጠቃቀሙ ወደ 64.5% ከፍ ብሏል፤ ይህም ጣልቃ-ገብነቱ መከላከያ እንዳይጠቀሙ እንቅፋት የሆኑባቸውን ችግሮች ለመፍታት ያለውን ውጤታማነት ያሳያል።

የተደረገው ትንተና እንደሚያሳየው መደበኛ ትምህርት ያላቸው ሴቶች ከጣልቃ-ገብነቱ በኋላ የእርግዝና መከላከያን የመጠቀም እድላቸው ከሌሎቹ በሦስት እጥፍ ይበልጣል (AOR = 3.42)።

ለእርግዝና መከላከያ በጎ አመለካከት ያላቸው ሴቶች አጠቃቀማቸው በአምስት እጥፍ (AOR = 5.21) ሲጨምር፣ ከፍተኛ በራስ የመተማመን ስሜት ያላቸው ደግሞ ዘዴዎቹን የመጠቀም እድላቸው ወደ አምስት እጥፍ ገደማ (AOR = 4.83) ከፍ ብሏል። ከሁሉ በላይ ጠንካራው ምክንያት የወንዶች ተሳትፎ ሆኖ ተገኝቷል፤ ባሎቻቸው በእርግዝና መከላከያ ውሳኔ ላይ የተሳተፉባቸው ሴቶች መከላከያ የመጠቀም እድላቸው በስድስት እጥፍ ጨምሯል (AOR = 6.11) (ሠንጠረዥ 1)። ጥናቱ ከመከላከያ አጠቃቀም ባሻገር በጥንዶች መካከል ያለውን ግንኙነት እና የወንዶችን ተሳትፎ በከፍተኛ ሁኔታ አሻሽሏል። ጥናቱ ከመጀመሩ በፊት የትዳር አጋራቸው ድጋፍ እንደሚያደርግላቸው የገለጹት ሴቶች 14% ብቻ ሲሆኑ፣ ከጣልቃ-ገብነቱ በኋላ ግን ይህ ቁጥር ወደ 66.1% አድጓል። ከፍተኛ በራስ የመተማመን ስሜት ያላቸው ሴቶች የተሻለ የጥንዶች ግንኙነትና የወንዶች ተሳትፎ የመኖሩ እድል በስድስት እጥፍ ገደማ (AOR = 5.87) ጨምሯል። ስለ መደበኛ ቀናት ዘዴ (ኤስዲኤም) ያለው ግንዛቤ እና ለእርግዝና መከላከያ ያለው አዎንታዊ አመለካከት ከትዳር አጋር ጋር ካለ የተሻለ ግንኙነት ጋር ቀጥተኛ ግንኙነት እንዳላቸው ተረጋግጧል።

እነዚህ ግኝቶች የሰነ-ልቦናዊ እና የግንኙነት ሁኔታዎች የስነ-ተዋልዶ ባህሪን በመቅረጽ ረገድ ያላቸውን ከፍተኛ ጠቀሜታ ያገኛሉ። ጥራት ላይ ያተኮሩ መረጃዎችም ይህንን የቁጥር ግኝት ያጠናክራሉ፤ ጣልቃ-ገብነቱ ስለ እርግዝና መከላከያ ያሉ የተሳሳቱ አመለካከቶችን ለማጥፋት፣ የጎንዮሽ ጉዳቶችን ፍራቻ ለመቀነስ እና በጥንዶች መካከል መተማመንን ለመፍጠር እንደረዳ ገልጸዋል። ሴቶች ስለ እርግዝና መከላከያ አጠቃቀም የመደራደር በራስ የመተማመን ስሜታቸው መጨመሩን ሲገልጹ፣ ወንዶች ደግሞ በቤተሰብ ምጣኔ ውሳኔዎች ላይ ድጋፍ ለማድረግ ያላቸው ፍላጎት መጨመሩን ገልጸዋል። ከማህበረሰቡ ባህል ጋር የተጣጣመው አቀራረብ እና አገልግሎቱ በቤተሰብ ደረጃ ተደራሽ መሆኑ ለእነዚህ ውጤቶች መገኘት ትልቅ አስተዋጽኦ አበርክቷል።

የዚህ ጥናት ውጤቶች እንደ መደበኛ ቀናት ዘዴ ያሉ በፅንሰ የመራባት ዕውቀት ላይ የተመሰረቱ ዘዴዎች፣ ውስን ሀብት ባለባቸው አካባቢዎች የእርግዝና መከላከያ አጠቃቀም ላይ የሚታዩ እንቅፋቶችን ለመፍታት ያለውን አቅም ያገኛሉ። የወር አበባ ዑደት መከታተያ ዕንቁዎች” ወይም “ሳይክሊኒክ ቢድስ” በማህበረሰብ ጤና ፕሮግራሞች ውስጥ በማካተት እና ወንዶችን በንቃት በማሳተፍ፣ ጥናቱ መረጃን መሰረት ያደረገ የቤተሰብ ምጣኔ ውሳኔ እንዲኖር ምቹ ሁኔታን ፈጥሯል። ትምህርት እና በራስ የመተማመን ስሜት ለስኬቱ ወሳኝ ምክንያቶች ሆነው መገኘታቸው፣ በቀጣይ የሚከናወኑ ተግባራት በሴቶች እውቀትና በራስ መተማመን ላይ ቅድሚያ መስጠት እንዳለባቸው ይጠቁማሉ።

ሠንጠረዥ 1፡ ከጣልቃ ገብነቱ በኋላ የወሊድ መከላከያ አጠቃቀም ትንበያ አመልካቾች፣ 2025

ተለዋዋጭ	ምድብ	AOR (95% CI)
ዕድሜ	15–24 (መነሻ ምድብ)	መነሻ
	25–35	1.76 (0.73–4.24)
መኖሪያ	ገጠር (መነሻ ምድብ)	መነሻ
	ከተማ	1.59 (0.58–4.38)
ሃይማኖት	አርቶዶክስ (መነሻ ምድብ)	መነሻ
	ሙስሊም	1.82 (0.38–8.71)
መደበኛ ትምህርት	የለም (መነሻ ምድብ)	መነሻ
	አለ	3.42 (1.40–8.37)**
ስለ ኤስዲኤም ዘዴ	አልሰማችም (መነሻ ምድብ)	መነሻ
	ሰምታለች	1.94 (0.82–4.58)
አዎንታዊ አመለካከት	የለም (መነሻ ምድብ)	መነሻ
	አለ	5.21 (2.01–13.49) *
ከፍተኛ ራስ-መተማመን	የለም (መነሻ ምድብ)	መነሻ
	አለ	4.83 (1.91–12.19) *
ጥሩ የባልና ሚስት መግባባት	የለም (መነሻ ምድብ)	መነሻ
	አለ	2.16 (0.86–5.42)
የወንድ ባል ተሳትፎ	የለም (መነሻ ምድብ)	መነሻ
	አለ	6.11 (2.30–16.21) *

የወንዶች ተሳትፎ ከፍተኛ ተጽዕኖ የነበረው መሆኑ፣ የጾታ እኩልነትን የሚያበረታቱ እና ለቤተሰብ ምጣኔ የጋራ ኃላፊነትን የሚያሳድጉ በጥንዶች ላይ ያተኮሩ ስልቶች እንደሚያስፈልጉ ያረጋግጣል። ግኝቶቹ በኢትዮጵያ የስነ-ተዋልዶ ጤና ፖሊሲ ላይ ሰፊ ፋይዳ አላቸው። መደበኛ ቀናት (ኤስዲኤም) ዘዴን በአገራዊ የእርግዝና መከላከያ አማራጮች ውስጥ ማካተት፣ ሆርሞን ነክ ያልሆኑ ዘዴዎችን ለሚመርጡ ሴቶች አማራጮችን ያስፋል፤ ይህም ያልተሟላ ፍላጎትን እና ያልተፈለገ እርግዝናን ይቀንሳል። በተጨማሪም፣ የዚህ ጣልቃ-ገብነት ስኬት እንደ ጤና ኤክስቴንሽን ፕሮግራም ያሉ ነባር የማህበረሰብ ጤና መዋቅሮችን በመጠቀም አነስተኛ ወጪ ያላቸው እና በቀላሉ ሊሰፋፉ የሚችሉ መፍትሄዎችን ማቅረብ እንደሚቻል ያሳያል።

ዕንቁዎች” ወይም “ሳይክል ቢድስ” ያሉ የወሊድ መቆጣጠሪያ የትምህርት ፕሮግራሞችን በስፋት ተግባራዊ ማድረግ አለባቸው።

- እንዲሁም እንደ መደበኛ ቀናት (ኤስዲኤም) ዘዴን ከሳይክል ቢድስ ጋር ያሉ በባህላዊ መልኩ ተቀባይነት ያላቸው የቤተሰብ ምጣኔ ዘዴዎችን አሁን ባለው የጤና ኤክስቴንሽን ፓኬጅ ውስጥ ማካተት ይኖርባቸዋል።
- የሚመለከታቸው ድርጅቶች በገጠር እና ዝቅተኛ የትምህርት ደረጃ ባላቸው የህብረተሰብ ክፍሎች ዘንድ ያሉ የተሳሳቱ አመለካከቶችን ለማጥፋት እና እንደ ሳይክል ቢድስ ያሉ የጎንዮሽ ጉዳት የሌለባቸውን አማራጮች ለማስተዋወቅ የግንዛቤ ማስጨበጫ ዘመቻዎችን ማካሄድ አለባቸው።

የፖሊሲ ምክሮች

- የጤና ጥበቃ ሚኒስቴር እና የክልል ጤና ቢሮዎች በጥንዶች መካከል ያለውን ግንኙነት የሚያሻሽሉ እና በባህላዊ መልኩ ተቀባይነት ያላቸውን እንደ የወር አበባ ዑደት መከታተያ



ሐረማያ ዩኒቨርሲቲ

የምርምር ጉዳዮች ጽ/ቤት

የፖሊሲ መግለጫ 2.3
ግንቦት 2018

የምርምር ትኩረት
መስክ

II

በእርግዝና ወቅት የሚከሰት የደም መፍሰስ፡- በምስራቅ ኢትዮጵያ በእናቶች እና አዲስ ለተወለዱ ሕፃናት የተጋረጠ ድምፅ አልባ ሲጋት

ሀይማኖት መዝሙር፣ ማለዳ ተፈራ፣ አደራ ደበላ፣ እና ሌታ ደገፋ²

የጤና እና የህክምና ሳይንስ ኮሌጅ፣ ሐረማያ ዩኒቨርሲቲ፣ ሐረር፣ ኢትዮጵያ

ቁልፍ መልዕክቶች

- በምስራቅ ኢትዮጵያ ከሚከሰቱ 100 እርግዝናዎች ውስጥ በግምት 8ቱ ከወሊድ በፊት ለከፍተኛ የደም መፍሰስ ይጋለጣሉ። ለዚህም ዋና ምክንያቶች የእንግዶ ልጅ ያለጊዜው ከማህፀን መላቀቅ (50.7%) እና የእንግዶ ልጅ የማህፀን በርን መሸፈን ወይም አጠገብ መሆን (44.9%) ናቸው።
- በእርግዝና ወቅት የሚከሰት የደም መፍሰስ ለከፋ ችግሮች ሲደርግ ይታያል፤ ከነዚህም መካከል ሕፃናት ያለጊዜአቸው መወለድ (43.5%)፣ የክብደት ማነስ (26.1%)፣ እናቶች በቀዶ ጥገና እንዲወልዱ መገደድ (55.1%) እና ለደም ማነስ በሽታ መጋለጥ (42%) በዋናነት ይጠቀሳሉ።
- ቀደም ሲል ብዙ ጊዜ ለፀነሱ፣ በታሪካቸው የቀዶ ጥገና ወሊድ ላጋጠማቸው፣ በምጥ መካከል አጭር የጊዜ ልዩነት ላላቸው (ከ24 ወራት ያነሰ) እና በእርግዝና ወቅት ጫት ለሚቅሙ እናቶች የደም መፍሰስ የመከሰት እድሉ ከፍተኛ ሆኖ ተገኝቷል።

መግቢያ

በእርግዝና ወቅት የሚከሰት የደም መፍሰስ ለምሳሌ ከወሊድ በፊት እና ከወሊድ በኋላ የሚከሰት ደም መፍሰስ በኢትዮጵያ ለእናቶች እና ለአዲስ ለተወለዱ ሕፃናት ሞት ዋነኛ መንስኤዎች አንዱ ነው። ይህም በሀገሪቱ ያለውን ከፍተኛ የሞት መጠን እንዲጨምር አድርጓል። የደም መፍሰስ ለእናቶች ሞት ከፍተኛውን ድርሻ የሚይዝ ሲሆን፣ ችግሩን ይበልጥ የሚያባብሰው ደግሞ ጥራት ያለውና ወቅታዊ የወሊድ ሕክምና አገልግሎት በበቂ ሁኔታ አለመገኘቱ ነው። ከባድ የእናት የደም መፍሰስ ሕፃናት ያለጊዜያቸው እንዲወለዱ፣ የክብደት መጠናቸው እንዲቀንስ እና ለመተንፈስ መቸገር እንዲያጋጥማቸው ስለሚያደርግ አዲስ ለተወለዱ ሕፃናት ሞት ትልቅ ምክንያት ይሆናል።

የእናቶችን ጤና አገልግሎት ለማሻሻል የተለያዩ ጥረቶች ቢደረጉም፣ መከላከል በሚቻል የእርግዝና ደም መፍሰስ ምክንያት የሚከሰተው ሞት አሁንም ከፍተኛ መሆኑ የቅድመ ወሊድ ክትትልን፣ የድንገተኛ ወሊድ ሕክምናን እና የማህበረሰቡን ግንዛቤ ማሳደግ አስፈላጊ መሆኑን ያሳያል። ይህ ጥናት በምስራቅ ኢትዮጵያ ከወሊድ በፊት የሚከሰት የደም መፍሰስን መጠን፣ ተያያዥ ምክንያቶችን እና በእናትና በፅንሰ ላይ የሚያስከትለውን ውጤት ለመገምገም ያለመ ነው። ይህም በእውቀት ረገድ ያሉ ከፍተኞችን በመሙላት፣ የእናቶችን እና የሕፃናትን ጤና ለማሻሻል ለማስረጃ ላይ የተመሰረቱ እርምጃዎችን ለመውሰድ ይረዳል።

አቀራረቦች እና ውጤቶች

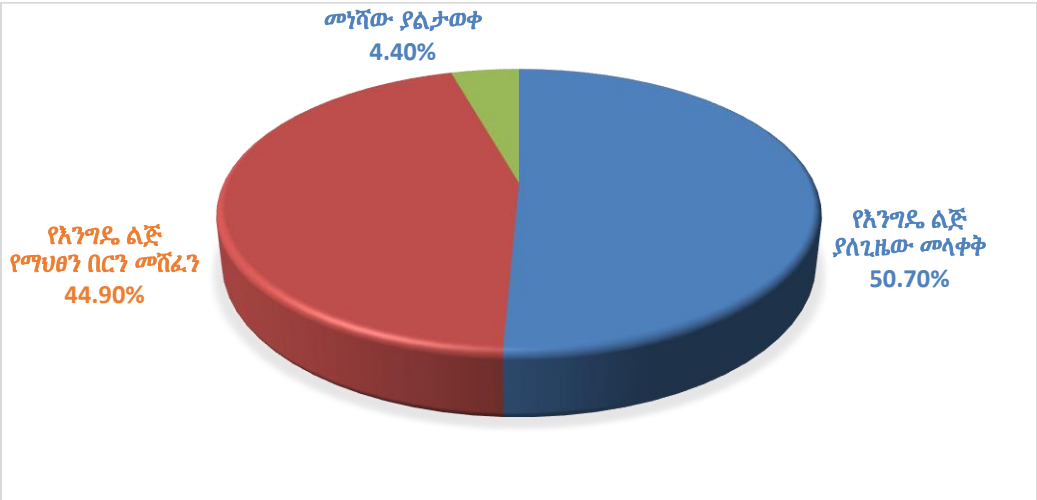
ጥናቱ ከሚያዝያ እስከ ሰኔ 2015 ዓ.ም በሐረሪ ክልል እና በድሬዳዋ አስተዳደር በሚገኙ አራት የመንግሥት ሆስፒታሎች ውስጥ የተካሄደ ሲሆን ተቋማዊ የክትትል ፊት መልክት ጥናትን መሰረት ያደረገ ነው። በነዚህ የጤና ተቋማት ውስጥ ከወለዱ እናቶች መካከል 882 የሚሆኑት፣ በእያንዳንዱ ተቋም ባለው የወሊድ መጠን መሠረት በሥልታዊ የዕድል ናሙና ምርጫ ዘዴ ለጥናቱ ተመርጠዋል። መረጃዎቹ የተሰበሰቡት ፊት ለፊት በሚደረግ ቃለ መጠይቅ እና የተዘጋጀ መጠይቅን በመጠቀም የሕክምና መዝገቦችን በመመርመር ነው። በጥናቱ ውጤት መሠረት፣ በአጠቃላይ በእርግዝና ወቅት የሚያጋጥም የደም መፍሰስ መጠን 7.8% ሆኖ ተገኝቷል። ከነዚህ አጋጣሚዎች መካከል ዋነኛው መንስኤ የእንግዶ ልጅ ያለጊዜው ከማህፀን መላቀቅ ሲሆን ይህም 50.7% ድርሻ አለው። በመቀጠልም የእንግዶ ልጅ የማህፀን በርን መሸፈን በ44.9% ተጠቃሽ ሲሆን፣ የቀረው 4.4% የሚሆነው ግን መንስኤው ያልታወቀ ነው (ምስል 1)።

ከተያያዥ ሁኔታዎች ጋር በተያያዘ የተደረገው ትንተና እንደሚያሳየው፤ ቀደም ሲል አምስት እና ከዚያ በላይ እርግዝና የነበራቸው እናቶች ለመጀመሪያ ጊዜ ከፀነሱ እናቶች ጋር ሲነጻጸር በእርግዝና ወቅት ለደም መፍሰስ የመጋለጥ ዕድላቸው በአምስት እጥፍ (AOR = 4.91) ከፍ ያለ ነው። በተመሳሳይ ሁኔታ፤ ቀደም ሲል በቀዶ ጥገና የወለዱ እናቶች በቀዶ ጥገና ካልወለዱት ጋር ሲነጻጸር ከወሊድ በፊት ለሚከሰት የደም መፍሰስ የመጋለጥ ዕድላቸው ከአራት እጥፍ በላይ (AOR = 4.45) ሲሆን፤ በሁለት እርግዝናዎች መካከል ያለው የጊዜ ልዩነት ከ24 ወራት ያነሰ መሆን ደግሞ የደም መፍሰስ የመከሰት ዕድሉን ከአምስት እጥፍ በላይ (AOR = 5.30) ይጨምረዋል። በተጨማሪም በእርግዝና ወቅት ጫት መቃም ለደም መፍሰስ አደጋ መጋለጥን ከሁለት እጥፍ በላይ (AOR = 2.39) እንደሚያሳድገው በጥናቱ ተመልክቷል።

በእርግዝና ወቅት የደም መፍሰስ ያጋጠማቸው እናቶች እና አዲስ የሚወለዱ ሕፃናት የጤና ውጤቶች እጅግ ከባድ ነበሩ። ችግሩ ካጋጠማቸው እናቶች መካከል ከግማሽ በላይ የሚሆኑት (55.1%) በቀዶ ጥገና እንዲወልዱ የተገደዱ ሲሆን፤ 42% የሚሆኑት ደግሞ ለደም ማነስ ተጋልጠዋል።

በአዲስ ለተወለዱ ሕፃናት ላይ የታዩት ችግሮችም ከፍተኛ ሲሆኑ፤ 43.5% የሚሆኑት ሕፃናት ያለጊዜአቸው የተወለዱ (preterm) እና 26.1% የሚሆኑት ደግሞ ዝቅተኛ የልደት ክብደት ያላቸው ሆነው ተመዝግበዋል። እነዚህ ግኝቶች በእርግዝና ወቅት የሚከሰት የደም መፍሰስ ያለውን የሕክምና እና የሕዝብ ጤና አስፈላጊነት እንዲሁም መከላከል ከሚቻሉ የአደጋ መንስኤዎች ጋር ያለውን ጠንካራ ግንኙነት ያሳያሉ።

በአራት የመንግሥት ሆስፒታሎች ውስጥ የታየው የ8% በእርግዝና ወቅት የሚከሰት የደም መፍሰስ ስርጭት፤ በምስራቅ ኢትዮጵያ ውስጥ ትኩረት የሚሻ የሕዝብ ጤና ፈተና መኖሩን ያመለክታል። የእንግዶ ልጅ ያለጊዜው መላቀቅ እና የእንግዶ ልጅ የማህፀን በርን መሸፈን በዋነኝነት መታየታቸው ከዓለም አቀፍ ሁኔታዎች ጋር የሚመሳሰል ቢሆንም፤ የችግሩ ስፋት እና ስርጭት ግን በአደጋ ተጋላጭነት ምርመራ፤ በቅድመ ወሊድ ክትትል ቀጣይነት እና በሪፈራል ዝግጁነት ላይ ከፍተኛ መኖራቸውን ያሳያል። ችግሩ ከብዙ ጊዜ እርግዝና፤ ከቀደም የቀዶ ጥገና ወሊድ እና ከአጭር የወሊድ መራራቅ ጋር ያለው ጠንካራ ትስስር፤ ከወሊድ በኋላ በሚሰጥ የቤተሰብ እቅድ አገልግሎት፤ ከቀዶ ጥገና ወሊድ በኋላ በሚሰጥ የምክር አገልግሎት እንዲሁም በቅድመ ወሊድ እና በድህረ ወሊድ ክትትል ውስጥ ተቀናጅተው በሚሰጡ የልደት መራራቅ አገልግሎቶች አማካኝነት መከላከል የሚቻልባቸውን እድሎች ቁልጭ አድርጎ ያሳያል።



ምስል 1: በጥናቱ ተሳታፊዎች መካከል በእርግዝና ወቅት ለሚከሰት የደም መፍሰስ መንስኤ የሆኑ ምክንያቶች

የፖሊሲ ምክሮች

- የጤና ጥበቃ ሚኒስቴር እና የክልል ጤና ቢሮዎች በእርግዝና ወቅት የሚከሰት የደም መፍሰስን አስቀድሞ የመለየት ሥራን ከቅድመ ወሊድ ክትትል ፕሮግራሞች ጋር በማቀናጀት ማጠናከር፤ እንዲሁም ወቅታዊ የሪፈራል ሥርዓት እና የድንገተኛ ወሊድ ሕክምና ዝግጁነትን ማረጋገጥ ይኖርባቸዋል።
- የጤና ጥበቃ ሚኒስቴር እና የክልል ጤና ቢሮዎች ለጤና ባለሙያዎች በእርግዝና ወቅት የሚከሰት የደም መፍሰስን አስቀድሞ በመገምገም፤ በሽተኛውን በማረጋጋት እና ተያያዥ ችግሮችን በመቆጣጠር ረገድ በክህሎት ላይ የተመሰረተ ስልጠና መስጠት አለባቸው።
- የሚመለከታቸው አካላት እና አጋር ድርጅቶች የወሊድ መራራቅን የሚያበረታቱ እና ስለ ደም መፍሰስ አደገኛ ሁኔታዎች ግንዛቤ የሚፈጥሩ በማህበረሰብ ላይ የተመሰረቱ ጣልቃ ጉብኝቶችን መደገፍ ይኖርባቸዋል፤ ይህም ጫት ማቆምን የሚመለከቱ የባህሪ ለውጥ ስልቶችን ማካተት አለበት።
- የጤና ጥበቃ ሚኒስቴር እና የክልል ጤና ቢሮዎች በእርግዝና ወቅት የሚከሰቱ የደም መፍሰስ ሁኔታዎችን፤ የሪፈራል ቅልጥፍን፤ እንዲሁም የእናቶችን እና የሕፃናትን የጤና ውጤቶች የሚከታተሉ የክትትልና ግምገማ ሥርዓቶችን ቅድሚያ ሰጥተው መዘርጋት ይኖርባቸዋል።



ሐረማያ ዩኒቨርሲቲ

የምርምር ጉዳዮች ጽ/ቤት

የፖሊሲ መግለጫ 3.1
ግንቦት 2018

የምርምር ትኩረት
መስክ

III

ለዘላቂ የገጠር መኖሪያ ቤቶች ግንባታ፣ የሚያገለግሉ ለአካባቢ ተስማሚ እና ዝቅተኛ ዋጋ ያላቸው የግንባታ ቁሳቁሶች

ሃምዛ አህመድ-ኑር¹ ፣ በዳሶ አህመድ¹ ፣ በለጠ ተፈራ¹ ፣ ዝክረ-ዓብ ነጋ¹ ፣ ታምራት ከበደ¹ ፣ እና ዳዊት አባተ¹

¹ሐረማያ የቴክኖሎጂ ኢንስቲትዩት ፣ ሐረማያ ዩኒቨርሲቲ ፣ ሐረማያ ፣ ኢትዮጵያ

ቁልፍ መልዕክቶች

- የባቴ አፈር ለጂኦፖሊመር (ከሲሊካ እና አልሚና የተመሠረተ ኢኮ-ተስማሚ ሰው-ሠራሽ የአንደኛ ደረጃ አገናኝ ንጥረ ነገር) ምርት የሚያስፈልገውን ከ70–90% የሚሆነውን የአሉሚኒየምኦክሳይድ መጠን ማሟላቱ ለዘርፉ ተስማሚ መሆኑን አረጋግጧል።
- በምርምር የተሻሻሉ በባቴ አፈር ላይ የተመሰረቱ የጂኦፖሊመር ብሎኮች 4.0 ሜጋ ፓስካል አማካኝ ጥንካሬ ያስመዘገቡ ሲሆን፣ ይህም በሲሚንቶ ከሚጠናከሩ ብሎኮች ጋር ተመጣጣኝ ነው።
- በተፈጥሮ አየር (በተለመደው የሙቀት መጠን) የደረቁ የጂኦፖሊመር ብሎኮች 3.4 ሜጋ ፓስካል ጥንካሬ ማሳየታቸው፣ ዝቅተኛ ዋጋ ላላቸው የገጠር መኖሪያ ቤቶች ግንባታ ተግባራዊ ሊሆኑ እንደሚችሉ ያሳያል።

ይህ ዘርፍ ወደ 40% የሚጠጋውን ዓለም አቀፍ ኃይል የሚጠቀም ሲሆን ለ33% ያህሉ የካርቦን ዳይኦክሳይድ ልቀትም ተጠያቂ ነው።

ለዚህ ልቀት ትልቁን ድርሻ የሚይዘው የፖርትላንድ ሲሚንቶ የማምረት ሂደት ሲሆን፣ አንድ ቶን ከሊንከር ሲመረት በግምት 0.9 ቶን CO₂ ወደ አየር ይለቀቃል። ይህም በየዓመቱ ወደ 2.8 ቢሊዮን ቶን የሚጠጋ የካርቦን ዳይኦክሳይድ ልቀት የሚያስከትል ሲሆን፣ ከዓለም አቀፍ ልቀትም ከ5–8% ድርሻ ይይዛል። ምንም እንኳን የፖርትላንድ ሲሚንቶ ጠንካራ የኢንጂነሪንግ ብቃት ቢኖረውም፣ ከአካባቢ ጥበቃ አንጻር ዘላቂነት የለውም። ስለዚህ በአካባቢው ከሚገኙ ግብዓቶች ዝቅተኛ የካርቦን ልቀት ያላቸውን የጂኦፖሊመር አማራጮችን ማልማት አስፈላጊ ነው። እንዲህ ያሉ የፈጠራ ውጤቶች የኢትዮጵያን የገጠር ቤቶች ችግር ለመቅረፍ፣ የ80% የሚሆነውን የገጠር ነዋሪ የኑሮ ደረጃ ለማሻሻል እና ለዓለም አቀፍ የአየር ንብረት ጥበቃ ጥረቶች ትርጉም ያለው አስተዋጽኦ ለማድረግ እጅግ አስፈላጊ ናቸው።

መግቢያ

አረንጓዴ የኮንስትራክሽን ቴክኖሎጂ የግንባታ ኢንዱስትሪውን እየደገፈ የአካባቢ ጥበቃን የሚያረጋግጥ አዲስ የፈጠራ አቀራረብ ነው። ትኩረቱም በአካባቢው የሚገኙ የክርስ ምድር ሀብቶችን እና የኢንዱስትሪ ተረፈ ምርቶችን በመጠቀም ዘላቂ፣ ዝቅተኛ ዋጋ ያላቸው እና ለአካባቢ ተስማሚ የሆኑ የግንባታ ቁሳቁሶችን ማልማት ላይ ነው። የኮንስትራክሽን ዘርፉ በዓለም አቀፍ ደረጃ ለኢኮኖሚ እድገት ወሳኝ ሚና ቢኖረውም፣ ለአካባቢ ብክለትም ከፍተኛ ድርሻ አለው። የኮንስትራክሽን ዘርፉ ከኃይል፣ ከትራንስፖርት፣ ከኢንዱስትሪ እና ከመሬት አጠቃቀም ለውጥ (እንደ የደን ምንጠራ) በመቀጠል በዓለም አቀፍ ደረጃ አምስተኛው ትልቁ የሰው ሠራሽ የካርቦን ዳይኦክሳይድ (CO₂) ምንጭ ነው።

አቀራረቦች እና ውጤቶች

ጥናቱ ሁለት የአፈር ዓይነቶችን የባቴ አፈር (ሐረማያ) እና የጉጉባ አፈርን ለጂኦፖሊመራይዜሽን እንደ ዋና ጥሬ ዕቃዎች በመጠቀም፣ በተጨማሪም የጫት አመድ እና የሽንኩራ አገዳ ገለባ (ባጋስ) አመድ አንድ ላይ ያላቸውን አቅም ገምግሟል። የቁሳቁሶቹ አካላዊ፣ ኬሚካላዊ እና ሚኒራላዊ ትንታኔዎች መደበኛ ዘዴዎችን እና መሣሪያዎችን በመጠቀም ተካሂደዋል።

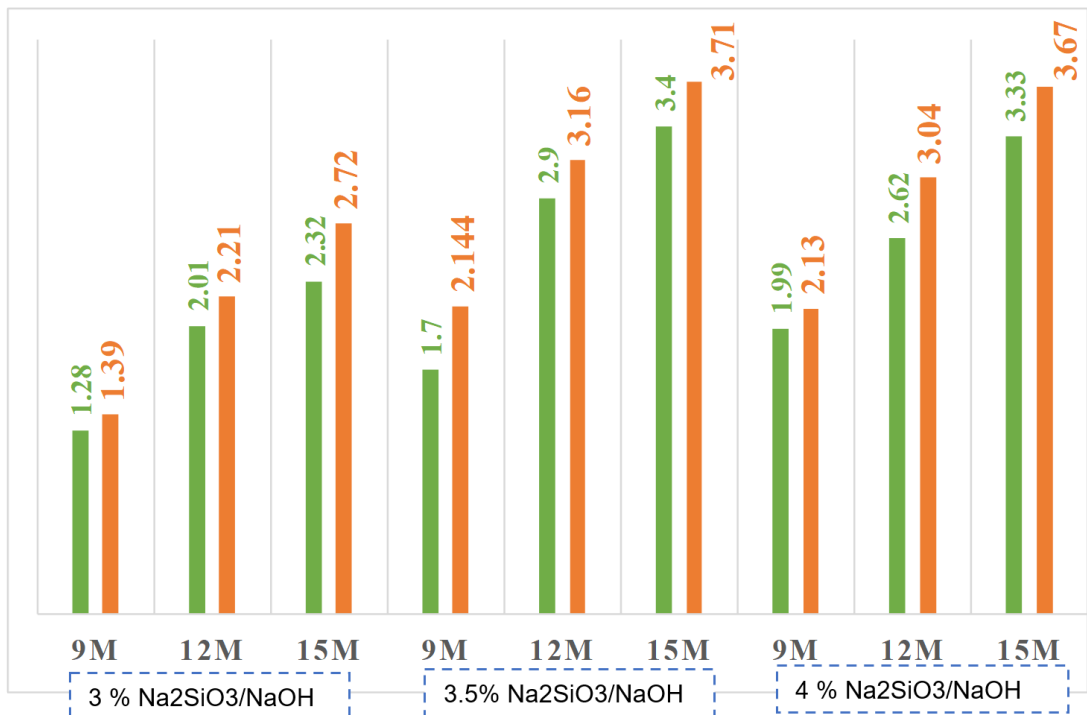
የሶዲየም ሃይድሮክሳይድ (NaOH) እና የሶዲየም ሲሊኬት (Na₂SiO₃) ውህደት እንደ አልካላይን አነቃቂ አንቀሳቃሽ ንጥረ ነገር ጥቅም ላይ ውሏል።

በባቴ አፈር ላይ የተመሰረቱ የጂኦሎጂ የሽክላ ጡቦች (ጂፒሲኢቢ) በ15 ሞላር ሶዲየም ሃይድሮክሳይድ (NaOH)፣ በ3.5 የሶዲየም ሲሊኬት እና ሶዲየም ሃይድሮክሳይድ (Na₂SiO₃/NaOH) ጥምርታ፣ እንዲሁም በ17.20%

የተዘጋጁት የጂኦሎጂ የተጨመቁ የሽክላ ጡቦች (ጂፒሲኢቢ) በተለያዩ የማድረቂያ ሁኔታዎች ውስጥ ለጥንካሬ ምርመራ ቀርበዋል፤ እነሱም፡- በማድረቂያ ምድጃ (በ80 °C ለ48 ሰዓታት + ለ14 ቀናት በክፍል ሙቀት) እና በተፈጥሮ አየር (በ25.5 °C ± 2 ለ60 ቀናት) ናቸው። በሁሉም ናሙናዎች ላይ የጨመቃ ጥንካሬ ምርመራ የተደረገ ሲሆን፣ የእነዚህ ለአካባቢ ተስማሚ የሆኑ አማራጮች ብቃት እና ተስማሚነት ለመገምገም በፖርትላንድ ሲሚንቶ ከሚጠናከሩ የሽክላ ጡቦች (ሲኤሢኢቢ) ጋር ንፅፅር ተደርጓል።

የባቴ አፈር በሲሊካ-አሎሚና የበለፀገ (በጥሩ ሁኔታ የተቀላቀለ አሸዋማ አፈር) መሆኑ የተረጋገጠ ሲሆን፣ የጉጉባ አፈር ግን በሲሊካ ይዘቱ ዝቅተኛ ሆኖ ተገኝቷል። የባቴ አፈር በአልካላይን ሲነቃቃ የሲሚንቶን ኬሚካላዊ ተግባር የሚተኩ አስፈላጊ አክሳይዶችን (SiO₂, Al₂O₃, Fe₂O₃) በውስጡ ይዟል። የጫት አመድ ደግሞ ከፍተኛ የኖራ (CaO) መጠን ያለው ሆኖ በመገኘቱ፣ እንደ ተፈጥሯዊ አፈር ማረጋገጫ ያገለግላል።

የአልካላይን መሟሟያ ሲዘጋጁ፤ ለ14 ቀናት በምድጃ ውስጥ ከደረቁ በኋላ ከፍተኛ 4.88 ሜጋ ፓስካል እና አማካኝ 4.00 ሜጋ ፓስካል ጥንካሬ አስመዝግበዋል። በተመሳሳይ ቀመር ተዘጋጅተው በተፈጥሮ አየር ለ60 ቀናት የደረቁት ደግሞ ከፍተኛ 3.71 ሜጋ ፓስካል እና አማካኝ 3.40 ሜጋ ፓስካል ጥንካሬ ደርሰዋል። ይህም ከብዙዎቹ ባህላዊ በእጅ የተሰሩ ጡቦች ጥንካሬ የሚበልጥ እና የህንፃ ክብደት የመሸከም ደረጃን የሚያሟላ ነው። ጥናቱ እንደሚያሳየው በተፈጥሮ አየር ማድረቅ ለአንድ ወለል ቤቶች ግንባታ በቂ ጥንካሬ የሚሰጥ በመሆኑ፣ ከፍተኛ ኃይል የሚፈጁ የኢንዱስትሪ ማድረቂያዎችን አስፈላጊነት ያስቀራል። የተቀላቀሉ የባቴ እና ጉጉባ አፈር ናሙናዎች በ14 ቀናት ውስጥ ከፍተኛ 4.2 ሜጋ ፓስካል እና አማካኝ 3.50 ሜጋ ፓስካል ጥንካሬ ያስመዘገቡ ሲሆን፣ በጉጉባ አፈር ላይ ብቻ የተመሰረቱት ግን በሲሊካ እጥረት ምክንያት ተቀባይነት ካለው የጥንካሬ መጠን በታች (0.91 ሜጋ ፓስካል) ውጤት አሳይተዋል፤ ይህም ክብደት የመሸከም አቅምን ለማግኘት የአፈር ምርጫ ወይም ውህደት ወሳኝ መሆኑን ያመለክታል።



ምስል 1: የባቴ አፈር የጂኦሎጂ የሽክላ ጡቦች (ጂፒሲኢቢ) በተለመደው የአየር ሙቀት ለ60 ቀናት ሲቆዩ ያላቸው ከፍተኛ እና አማካኝ የጨመቃ ጥንካሬ

የጥናቱ ውጤት እንደሚያሳየው፣ የባቴ አፈር ለጄኦፖሊመር ምስረታ አስፈላጊ የሆኑ ኬሚካላዊ እና አካላዊ ባህሪያት ያሉት ሲሆን፣ ከብደት መሸከም ለሚገባቸው የግንባታ ስራዎች የተቀመጠውን የጥንካሬ መስፈርት በቋሚነት የሚያሟሉ የጄኦፖሊመር የሽክላ ጡቦችን (ጂፒሲኢቢ) ያመርታል። ከፍተኛ የሲሊካ እና አሉምኒያ ይዘቱ፣ አነስተኛ ደቀቅ ያሉ ቅንጣቶች መኖራቸው እና የመለጠጥ ባህሪ የሌለው መሆኑ ጠንካራ የጄኦፖሊመር ትስስር እንዲፈጠር አስተዋጽኦ ያደርጋሉ፤ እንዲሁም የተመጣጠኑ የአልካላይን አነቃቂዎች ጥምርታ በምድጃም ሆነ በተፈጥሮ አየር ማድረቂያ ሁኔታዎች ውስጥ የጨመቃ ጥንካሬን በከፍተኛ ሁኔታ አሻሽለዋል። በአንጻሩ የጉጉባ አፈር ያለው ዝቅተኛ የሲሊካ መጠን ከኬሚካሎች ጋር የመዋሃድ አቅሙን ስለሚገድበው፣ ከባቴ አፈር ጋር ካልተቀላቀለ በቀር ዝቅተኛ ውጤት እንዲያሳይ አድርጎታል። በባቴ አፈር የተሰሩ ምርጥ የጄኦፖሊመር ጡቦች ጥንካሬ ከተለመዱት በሲሚንቶ ከሚጠናከሩ ብሎኮች ጋር ተመጣጣኝ ነው፤ ይህም በዝቅተኛ ዋጋ ለሚከናወኑ ዘላቂ የግንባታ ስራዎች የጄኦፖሊመር አማራጮችን መጠቀም እንደሚቻል ያረጋግጣል። የባቴ አፈር ለጄኦፖሊመር የሽክላ ጡቦች ግንባታ እጅግ ተስማሚ የአካባቢ ግብዓት ሲሆን፣ ከሲሚንቶ ለሚሰሩ ቁሳቁሶች ዝቅተኛ የካርቦን ልቀት ያለው እና በመዋቅራዊ ሁኔታ አስተማማኝ የሆነ አማራጭ ያቀርባል።

የፖሊሲ ምክሮች

- የከተማ እና መሠረተ ልማት ሚኒስቴር ዘላቂ እና በጄኦፖሊመር ላይ የተመሰረቱ የግንባታ ቁሳቁሶችን በአገራዊ የህንፃ መመሪያዎች ውስጥ ማካተት እና በተመጣጣኝ የቤት ግንባታ ፕሮጀክቶች ላይ ጥቅም ላይ እንዲውሉ ማበረታታት ይኖርበታል።
- የክልል መንግሥታት የጄኦፖሊመር የሽክላ ጡቦችን (ጂፒሲኢቢ) የሚጠቀሙ የሙከራ ቤት ግንባታ ፕሮጀክቶችን በመደገፍ የቁሳቁሱን ብቃት በተግባር ማሳየት እና በአካባቢው ማህበረሰብ ዘንድ ተቀባይነት እንዲያገኝ ማድረግ አለባቸው።
- የከተማ እና መሠረተ ልማት ሚኒስቴር እንዲሁም ሌሎች የሚመለከታቸው አካላት ለአነስተኛ እና መካከለኛ ኢንተርፕራይዞች እና ለአካባቢው አምራቾች ቴክኒካዊ ስልጠና እና ድጋፍ በመስጠት፣ ለአካባቢ ተስማሚ የሆኑ የግንባታ ቁሳቁሶችን ምርት በከፍተኛ ደረጃ ማሳደግ ይኖርባቸዋል።



ሐረማያ ዩኒቨርሲቲ

የምርምር ጉዳዮች ጽ/ቤት

የፖሊሲ መግለጫ 4.1
ግንቦት 2018

የምርምር ትኩረት
መስክ

IV

በምስራቅ ሐረርጌ ለማህበራዊ ትስስር እና ለአካባቢያዊ ልማት የሚውሉ የሥራ እና የሕይወት ዑደት የቃል ትውፊቶች

አበራ ኢድማሱ¹፣ ጄይላን ወልደ¹፣ መሐመድ ሀሰን²፣ እና መሐመድ አብደ³

የውጭ ቋንቋዎች እና ጋዜጠኝነት ትምህርት ቤት፣ ሐረማያ ዩኒቨርሲቲ ፣ ሐረማያ ፣ ኢትዮጵያ
የታሪክ እና የቅርስ አስተዳደር ትምህርት ቤት፣ ሐረማያ ዩኒቨርሲቲ ፣ ሐረማያ ፣ ኢትዮጵያ
የአፋን ኦሮሞ፣ ሥነ-ጽሁፍ እና ተግባራት ትምህርት ክፍል፣ ሐረማያ ዩኒቨርሲቲ ፣ ሐረማያ ፣ ኢትዮጵያ

ቁልፍ መልዕክቶች

- የሥራ ዘፈኖች እና 'ሚሪይሳ' (Mirriiysaa) የቃል ወገኛ የሥራ ኃይልን የሚያስተባብሩ፣ የቁጠባ ባህልንና ከምርት ስብሰባ በኋላ ሊኖሩ ስለሚገቡ ደንቦች እውቀት የሚያስተላልፉ፣ እንዲሁም ቅሬታዎችንና የሥነ-ምግባር ምክሮችን በነፃነት ለመግለጽ የሚያገለግሉ ውጤታማ የሲቪክ መሣሪያዎች ናቸው።
- የጋብቻ ስነ-ስርዓት ዘፈኖች እና የውዳሴ አይነቶች ወጣቶች ኃላፊነትን እንዲላመዱ እና እርስ በእርስ እንዲከባበሩ ያደርጋሉ፤ እንዲሁም በሕይወት ምዕራፍ ሽግግር ወቅት ባህላዊ ተቀባይነት ያላቸውን ምክሮች ለመለገስ ያገለግላሉ።
- የሴቶች የቃል ስነ-ጥበብ ውጤቶች (እንደ ሂንዲክ/hindikoo እና ልጅ ማስተኛ ዘፈኖች) የሴቶችን ድምፅ እና በማህበረሰቡ ውስጥ ያላቸውን ተሰሚነት ጠብቀው ያቆያሉ። ይሁን እንጂ በግብርናው ዘርፍ የሚታየው ዘመናዊ አሰራር እና የሰዎች ከአንድ ቦታ ወደ ሌላ ቦታ መንቀሳቀስ መጨመር እነዚህ ወገኖች እንዲታዩ በማድረግ፣ በትውልዶች መካከል የሚተላለፈውን እውቀት እና ስነ-ልቦናዊ ድጋፍ እየሸረሸረው ይገኛል።

መግቢያ

በመላው አፍሪካ የሚገኙ የቃል ወገኛ እውቀትን ለማስተላለፍ፣ ማህበራዊ እሴቶችን ለማጠናከር እና የማህበረሰቡን የጋራ ህይወት ለማስቀጠል እንደ ዋነኛ ተቋማት ሲያገለግሉ ቆይተዋል። በምስራቅ ሐረርጌ በሚኖረው የኦሮሞ ማህበረሰብ ዘንድ እነዚህ ወገኛ የጥበብ መግለጫዎች ብቻ ሳይሆኑ፤

ስነ-ምግባርን የሚመሩ፣ ትብብርን የሚያጠናክሩ እና የጋራ ትውስታን ጠብቀው የሚያቆዩ ተግባራዊ ስርዓቶች በመሆን ዛሬም ድረስ በንቃት ያገለግላሉ። እንደ ሚሪይሳ (mirriiysaa)፣ ደረሻ (darashaa)፣ ሹብዶ (shobdo)፣ ሂንዲክ (hindikkoo)፣ ሽጎዬ (shaggooyee)፣ ሄሌ/ሄሌማ (heellee/heellemaa) እና የተለያዩ የውዳሴ ዜማዎች ያሉ የዘወግ አይነቶች ማህበረሰቡ የሥራ ኃይልን የሚያስተባብርባቸው፣ ወጣቶችን የሚያስለጥንባቸው፣ ማህበራዊ ግዴታዎችን የሚገልጽባቸው እንዲሁም ስሜታዊ እና ሲቪካዊ መግለጫዎችን የሚያስተናግድባቸው ባህላዊ መሠረት ያላቸው የአሰራር ዘዴዎች ናቸው።

ዛሬ ግን በከተማ መስፋፋት፣ በጋራ የሥራ ባህል መዳከም፣ በሚዲያ ተፅዕኖ መስፋፋት እንዲሁም በሃይማኖታዊ ወይም በአስተዳደራዊ አመለካከቶች ለውጥ ሳቢያ እየታዩ ያሉ ፈጣን ማህበራዊ፣ ኢኮኖሚያዊ እና ባህላዊ ለውጦች እነዚህ የቃል ወገኛ በባህላዊ መንገድ የሚያብቡባቸውን መድረኮች እያጠበቁ ይገኛሉ። እነዚህ ተፅዕኖዎች እየበረቱ ሲሄዱ፣ የትውልድ ቅብብሎሽ እየደከመና በተለይም የሴቶች የመገለጫ/መታያ መድረኮች እየቀነሱ መጥተዋል። እነዚህን የጥበብ ውጤቶች በትምህርት ቤቶች፣ በወጣቶች ማዕከላት፣ በማህበረሰብ ስብሰባዎች እና በአካባቢ መገናኛ ብዙኃን ውስጥ እንደገና ማነቃነቅ፣ ማህበራዊ ትስስርን ለመገንባት፣ የልማት ሥራዎችን ለማበልጸግ እና በምስራቅ ሐረርጌ ለማህበረሰቡ ጥንካሬ መሠረት ሆኖ የቆየውን ሕያው ቅርስ ለመጠበቅ ዝቅተኛ ወጪ የሚጠይቅና ከባህል ጋር የተዛመደ ስልታዊ መፍትሔ ነው።

አቀራረቦች እና ውጤቶች

ይህ ጥናት በተለያዩ የምስራቅ ሐረርጌ ወረዳዎች ውስጥ ጥልቀት ያለው የስነ-ተዋጽኦ ዘዴዎችን ትርጓሜ ተኮር ቃለ-መጠይቆችን፣ የቡድን ውይይቶችን እና የተሳታፊ ምልከታን በመጠቀም ተካሂዷል። የቃል ጽሑፎች ተሰብስበው፣ በጽሑፍ ሰፍረው፣ እንዲሁም በስነ-ግጥማዊ እና በትውፊታዊ ትርጓሜ ማዕቀፎች አማካኝነት ትንታኔ ተደርጎባቸዋል፤ ይህም ተመራማሪዎቹ የባህላዊ ክዋኔዎችን ይዘት ከማህበራዊ ሁኔታዎች ጋር እንዲያገናኙ አስችሏቸዋል። ጥናቱ የሀገር ሽማግሌዎችን፣ ሴቶችን፣ ወጣቶችን፣ የሃይማኖት መሪዎችን፣ ገጣሚዎችን እና የባህል ባለሙያዎችን ያሳተፈ ሲሆን፣ ይህም የቃል ወገን በዕለት ተዕለት ሕይወት ውስጥ እንዴት እንደሚሠሩ፣ ከተለዋዋጭ ሁኔታዎች ጋር እንዴት እንደሚመደቡ እና ማህበረሰቡ ለወቅታዊ ማህበራዊ፣ ኢኮኖሚያዊ እና የሥነ-ምግባር ፈተናዎች መፍትሄ ለመስጠት እንዴት እንደሚጠቀምባቸው በጥልቀት ለመመርመር አስችሏል።

ሚርይሳ (Mirriysaa) ለማህበራዊ ትችት፣ ለትውስታ እና ለሥነ-ምግባር ግንባታ የሚያገለግል የሕዝብ መድረክ ነው። በሚርይሳ ክዋኔ ወቅት መጀመሪያ “ጥልቅ ትኩረት ሰጥቶ ለመስማት” (guurii gurraa fudhadhu) ጥሪ ይደረጋል። ሚርይሳ በማህበረሰቡ ውስጥ ያሉ ኢፍትሃዊነቶችን፣ የአመራር ድክመቶችን እና የጋራ ችግሮችን ወደ አደባባይ የሚያወጣ ሲሆን፣ ይህም የሚከናወነው አክብሮት በተሞላበት የውይይት ሥርዓት ነው። የግጥም ስንጥቶች የታሪክ ጠባሳዎችን (ለምሳሌ የጨለንቆ ጦርነትን) በማስታወስ ከወቅታዊ የአመራር ፈተናዎች ጋር ያገናኙታል።

ለትኩረት እና ለትውስታ የሚቀርብ የሚርይሳ ጥሪ ምሳሌ፡-
Dhagahii dhaggeeffadhuu... guurii gurraa fudhadhuu
Yaaboo lola gaafa Calanqoo himadhu moo nin dhiisaa?

ትርጉም፡- በማስተዋል ሰማ... የጆሮህን ኩል (ሰም) አሰወግድ (ጥልቅ ትኩረት ሰጥ)። ስለ ጨለንቆ ጦርነት ቀን ልንገራችሁ ወይንስ ዝም ልበል?

መልዕክት፡- ህመምን የሚቀሰቅሱ የታሪክ ትውስታዎችን እንደገና መክፈት ዓላማው ንቃተ-ህሊናን እና የጋራ ኃላፊነትን ለማስተማር ነው።

ይህም ለሲቪክ ትምህርት ምቹ የሆነና በ“ጥሪና ምላሽ” ላይ የተመሰረተ አስተማማኝ መድረክ ይፈጥራል። ይህ የውይይት መዋቅር ማህበረሰቡ ያለ ግጭትና ግብግብ ተጠያቂነትን እና መተሳሰብን እንዲለማመድ ያደርጋል።

ባህላዊ የሥራ ዜማዎች የሥራ ኃይልን ያስተባብራሉ፤ እንዲሁም ስለ ምርታማነት፣ ስለ ቁጠባ እና ስለ ፍትሃዊነት ያሉ እሴቶችን ያስተላልፋሉ። **ደረሻ (Darashaa)**፡- በጉዛ (ብዙ ሰዎች ለአንድ ግለሰብ የእርሻ ሥራ ድጋፍ የሚሰጡበት ሥርዓት) ወቅት የቡድን ጥረትን ለማቀናጀት፣ ሥራ በወቅቱ

እንዲጠናቀቅ ለማበረታታት እና ማህበራዊ ደንቦችን ለማስተላለፍ ያገለግላል። እነዚህ ደንቦች፡- ብክነትን ማስወገድ፣ ጊዜን በአግባቡ መጠቀም፣ እህል መቆጠብ፣ ሠራተኞችን በፍትሃዊነት መያዝ እና ለጥረታቸው ተገቢውን ዋጋ መስጠትን ያካትታሉ።

ሹብዶ (Shobdo)፡- ምርት በሚወቃበት ወቅት አንድ ከበሮ ድምፅ ያለ ምት በመፍጠር የሥራውን ፍጥነት እና ተነሳሽነት ለመጠበቅ ይረዳል። ቀደም ባሉት የጭሰኝነት ሥርዓቶች ወቅት ይህ ዜማ በብዝበዛ ላይ የሚደረግ ስውር የተቃውሞ መግለጫ ሆኖ ያገለግላል ነበር።

በአጠቃላይ እነዚህ ዜማዎች የሥራ ባህሪን እና የሚጠበቁ ውጤቶችን የሚመሩ "ለስላሳ ደንቦች" በመሆን ያገለግላሉ። የደረሻ (Darashaa) ምሳሌ፡- ከምርት ስብሰባ በኋላ ስላለው ጥንቃቄ እና ቁጠባ

Haati dhiiraa ni beeytii; firii buute ni fuutii
ትርጉም፡- የወንዶች እናት (ብልህ እናት) ታውቃለች፤ መሬት ላይ የወደቀውን እህል ትለቅማለች።
መልዕክት፡- ብክነትን መቃወም፤ ምርትን በጥንቃቄ በመያዝ የቤተሰብን የምግብ ዋስትና ማረጋገጥ።

ሹብዶ (Shobdo) — የሥራ ተነሳሽነት እና ስውር ተቃውሞ ሹብዶ የሥራውን ምት (Rhythm) ለመጠበቅ ከማገልገሉም በላይ፣ ፍትሃዊ ባልሆነ አገዛዝ ላይ ስውር ትችቶችን ለማቅረብ ያገለግላል። ይህም በሥራ ሂደት ውስጥ የታጀበ የሞራል ተግባር ነው።

ምሳሌ፡- Haromaayaan leenci bulee; ohoo hayee...
Barre laashaa akka sootii...

ትርጉም፡- አንበሳው ሐረማያ አደረ... እንደ ሱቲ (ለስላሳ ጅራፍ) አገዛዝህን አለስልሲ...

መልዕክት፡- የሥራውን ፍጥነት ጠብቆ በመቀጠል፣ ፍትሃዊ ያልሆነ አገዛዝ እንዲታረም በዜማ የታጀበ ለስላሳ ግፊት ማድረግ።

ሂንዲኮ (Hindikkoo) — የሴቶች ድምፅ እና ማህበራዊ ድጋፍ።

ሂንዲኮ ሴቶች ሽከማቸውን የሚያቃልሉበት፣ እርስ በእርስ የሚመካከሩበት እና በማህበራዊ ግንኙነታቸው ላይ ገደብ የሚያበጁበት የግልጽነት መድረክ ነው። ቀደም ሲል እህል በእጅ በሚፈጭበት ወቅት የሚዘፈን ሲሆን፣ በአሁኑ ወቅት የወፍጮ ቤቶች መስፋፋት ይህንን የሴቶች የጋራ መድረክ እያጠፋው ይገኛል። ይህ ደግሞ ሴቶች እርስ በእርስ የሚሰጣጡትን ማህበራዊ ድጋፍ እና የቤት ውስጥ አያያዝ እውቀት ሽግግርን ይቀንሰዋል።

ምሳሌ (ሂንዲኮ — ለትጋት እና ለሥነ-ምግባር የሚሰጥ ማነቃቂያ) ፦ Sihi, mooyeen maal si seete... Haftuu ulfoofte si seete...

ትርጉም፦ አንቺዬ! ሙቀጫው ምን መሰለሽ... “ሳታገባ ያረገዝኸ” መሰለሽ (የሰነፍሽው ለዛ ነው ወይ?) መልዕክት፦ ሴቶች በስራቸው እንዲበረቱ እና አደገኛ ከሆኑ ማህበራዊ ባህሪያት እንዲቆጠቡ በጨዋታ መልክ የሚደረግ የባልደረባ ቁጥጥር።

የጋብቻ እና የወጣትነት የጥበብ ዘውዳች ወጣቶች ወደ አዋቂነት በሚሸጋገሩበት ወቅት እንደ ባህላዊ የትምህርት ዘዴ ያገለግላሉ። **ሸጎዬ (Shaggooyee)**፦ የወጣትነትን ተነሳሽነት፣ የትዳር አጋር ምርጫን እና ጨዋታን ያደምቃል።

ሄሌ/ሄሌማ (Heellee/Heellemaa)፦ ለሙሽሮች ተግባራዊ ምክሮችን ይሰጣሉ። ይህም ከባል እና ከአማኞች ጋር ሊኖር የሚገባውን ተግባቦት፣ ራስን መግዛት እና ክብርን ያሳላሉ። የመጥፋት ስጋት፦ እነዚህ ወጎች በዘመናዊ ሚዲያ፣ ቀደም ሲል በነበሩ አስተዳደራዊ ተጽዕኖዎች እና ጥብቅ ሃይማኖታዊ ትርጓሜዎች ምክንያት እየጠፉ መሆናቸው፣ ወጣቶች ስለ አዋቂነት ሕይወት የሚማሩበትን ባህላዊ መድረክ እያሳጣቸው ይገኛል።

ምሳሌ 1: ሸጎዬ — አድናቆት እና ፍቅር
Urjiin samii tanaa lakkoofsattuu kumaa... Eessaa asiin baatee takkiittii akka kumaa...
ትርጉም፦ የሰማይ ከዋክብት ቁጥራቸው ሺህ ነው፤ አንቺ እንደ ሺህ የምትቆጠራው ከየት መጣሽ?
መልዕክት፦ አወንታዊ አድናቆት እና ምርጫ፤ በወጣቶች መካከል መከባበርን እና በራስ መተማመንን ይገነባል።

ምሳሌ 2: ሄሌ - ለሙሽሪት የሚሰጥ ምክር
Ayiyoon amba arrabde jette bafte sihimtii gargari galla...
ትርጉም፦ ቅቤውን በጥንቃቄ ተጠቀሚ፤ አማትሽ "ቶሎ ጨረሰሽው" ብላ እንዳትወቅስሽ።
መልዕክት፦ የቤት ውስጥ አያያዝ ጥንቃቄ እና መልካም ግንኙነት፤ በትዳር ውስጥ ሊኖር የሚገባ ለስላሳ የሥነ-ምግባር ደንብ።

የውዳሴ ዜማዎች — ማንነት እና ስሜታዊ ብስለት

የውዳሴ ዜማዎች የግብርና ማንነትን እና ስሜታዊ ተግባቦትን ያጠናክራሉ። ልጅ ማስተኛ ዘፈኖች (Lullabies)፦ እናቶች ስጋታቸውን የሚገልጹበት እና በቤት ውስጥ ያላቸውን ስልጣን/ተሰሚነት የሚደራደሩበት መድረክ ናቸው። የክብት ውዳሴዎች፦ እንስሳትን በጥንቃቄ መንከባከብን ያበረታታሉ፤ እንዲሁም የቤተሰቡን የኢኮኖሚ መሠረት ያከብራሉ። እነዚህ ዘውዳች በመልካም ከብት እርባታ፣ በምስጋና፣ እንዲሁም

በሰው፣ በምድር እና በእንስሳት መካከል ባለው ትስስር ላይ ያተኩራሉ።

የፖሊሲ ምክሮች

- ለትምህርት ሚኒስቴር እና ለኦሮሚያ ትምህርት ቢሮ እንደ ሚርይሳ፣ ደረሻ/ሹብዶ፣ ሂንዲኮ፣ ሸጎዬ እና ሄሌ ያሉ አገር በቀል ግጥሞችንና ዜማዎችን በትምህርት ቤት ክለሶች፣ ከተጨማሪ ሥርዓተ-ትምህርት መርሃ-ግብሮች እና ከሥነ-ጥበብ/ሥነ-ጽሑፍ ክፍለ-ጊዜዎች ጋር ማቀናጀት ያስፈልጋል። ይህም ተማሪዎች በታቀደ እና በተቀናጀ መልኩ ስለ ባህላቸው እንዲማሩ ዕድል ይፈጥራል።
- የሴቶችና ማህበራዊ ጉዳይ ሚኒስቴር እንደ ሂንዲኮ (hindikkoo) ያሉ በሴቶች የሚመሩ የባህል መድረኮችን እንደ አስተማማኝ የማህበረሰብ መሰብሰቢያ ቦታዎች እንዲያገለግሉ በገንዘብና በቁሳቁስ መደገፍ ይኖርበታል። በተጨማሪም የሴቶችን የቃል ጥበባት የሚያነቃቁ እና በትውልዶች መካከል ያለውን የእውቀት ሽግግር በማጠናከር የሴቶችን ባህላዊ ተሰሚነት የሚያሳድጉ የልምድ ልውውጥ ፕሮግራሞችን ማመቻቸት አለበት።
- የባህልና ስፖርት ሚኒስቴር እና የኦሮሚያ ባህልና ቱሪዝም ቢሮ የማህበረሰቡን የቃል ጥበባት ፍትሃዊ የሆነ የአእምሯዊ ንብረት ጥበቃ በሚያረጋግጥ መልኩ መቅረጽና እና በቤተ-መዝገብ ማስቀመጥ ይኖርባቸዋል። በተጨማሪም ወቅታዊ የሆኑ የጉዞ (የጋራ እርሻ ስራ) እና ከምርት ስብሰባ በኋላ የሚደረጉ ፌስቲቫሎችን እንደ ባህላዊ የጥበብ መድረክ መልሶ ማቋቋም፤ እንዲሁም ከመገናኛ ብዙኃን ጋር በመተባበር ስለ ቃል ወጎች የሚያስተምሩ ተከታታይ የፊዲዮ ፕሮግራሞችን ማዘጋጀት አለባቸው።
- የወረዳ እና ቀበሌ አስተዳደሮች የማህበረሰቡን ባህላዊ ኩነቶች መደገፍ፣ ለሂንዲኮ (hindikkoo) የሴቶች የውይይት መድረኮች የሚሆኑ ቦታዎችን ማመቻቸት፣ እንዲሁም ከሀገር ሽማግሌዎች ጋር የሚደረጉ የመረጃ አስባሰብ እና ሰነድ ዝግጅት ሥራዎች ሥነ-ምግባራዊ በሆነ መንገድ መከናወናቸውን ማረጋገጥ ይኖርባቸዋል።
- ዩኒቨርሲቲዎች የቃል ወጎችን የመመዝገብ እና የማጥናት ሥራን መደገፍ ይኖርባቸዋል። በተጨማሪም መምህራን፣ የባህል ባለሙያዎች እና የማህበረሰብ ተራድኦ ሠራተኞች ቅርሶችን እንዴት መጠበቅ እና መንከባከብ እንደሚችሉ አስፈላጊውን የሙያ ስልጠና እንዲያገኙ ማድረግ አለባቸው።



ሐረማያ ዩኒቨርሲቲ

የምርምር ጉዳዮች ጽ/ቤት

የፖሊሲ መግለጫ 4.2
ግንቦት 2018

የምርምር ትኩረት
መስክ

IV

የባለ ብዙ ባህል ሥርዓተ-ትምህርት አተገባበር ክፍተቶች :- ከምስራቅ ኢትዮጵያ የመንግስት ዩኒቨርሲቲዎች የተገኙ ማስረጃዎች

ደበላ ተዘራ¹፣ ይልፋሸዋ ስዩም¹፣ ዳዊት ነጋሳ¹፣ ጋርኬቦ ባሻ¹

¹የትምህርት እና ስነ-ባህርይ ሳይንስ ኮሌጅ፣ ሐረማያ ዩኒቨርሲቲ፣ ኢትዮጵያ

ቁልፍ መልዕክቶች

- በምስራቅ ኢትዮጵያ የመንግስት ዩኒቨርሲቲዎች የባለ ብዙ ባህል (ለመድብለ-ባህላዊ) ሥርዓተ ትምህርት አተገባበር በአጠቃላይ ዝቅተኛ ነው፤ ይህም በአብዛኛዎቹ የመማሪያ ክፍል የመድብለ ባህላዊ ተሳትፎ ልኬቶች ደካማ ልምድን ያሳያል
- መምህራን የባለ ብዙ ባህል ሥርዓተ-ትምህርት አተገባበር ያላቸው ቁርጠኝነት ዝቅተኛ መሆኑን የሚያሳይ ሲሆን፣ ትርጉም ያለው የመድብለ-ባህላዊ ሥርዓተ-ትምህርት አፈጻጸምን ለመደገፍም የመምህራን ተነሳሽነት አሁንም በቂ አይደለም።
- የባለ ብዙ ባህል ትምህርት እንቅፋቶች፡- ዝቅተኛ ግንዛቤ፣ ውስን ክትትልና ድጋፍ እንዲሁም ውስን መመሪያዎችና የመማሪያ ቁሳቁሶች፣ የባለ ብዙ ባህል ትምህርት ባለሙያዎች እጥረት እና የአመራር ትኩረት ማነስ ናቸው፤ እነዚህ ሁሉ ችግሮች በመንግሥት ዩኒቨርሲቲዎች ውስጥ ብዝሃነትን እና አካታች የሥርዓተ-ትምህርት ልምዶችን ለማሳደግ የሚደረገውን ጥረት ያደናቅፋሉ።

መግቢያ

በዓለም ዙሪያ የሚገኙ ከፍተኛ የትምህርት ተቋማት (HEIs) እየሰፋ ለመጣው የባህል፣ የቋንቋ፣ የብሔር እና የርዕዮተ-ዓለም ብዝሃነት ምላሽ እንዲሰጡ ከጊዜ ወደ ጊዜ እየተጠየቁ ይገኛሉ። በዚህ ረገድ፣ መድብለ-ባህላዊ ትምህርት በተለያዩ የመማሪያ አካባቢዎች ውስጥ እኩልነትን፣ መቻቻልን፣ አብሮ መኖርን እና ማህበራዊ ትስስርን ለማጎልበት እንደ ወሳኝ ስልት ብቅ ብሏል። ትምህርት በመሠረቱ ለማህበራዊ ለውጥ የሚያገለግል መሣሪያ ሲሆን፣ ሥርዓተ-ትምህርት ደግሞ የዚህ ሂደት ማዕከል ወይም "የትምህርት ልብ" በመሆን የተማሪዎችን አመለካከት፣ ብቃት እና ማንነት በሚቀርጽ

መልኩ ማስተማርን፣ መማርን፣ ምዘናን እና ማህበራዊ ግንኙነትን ይመራል። የዓለም የትምህርት ሥርዓቶች ከብዝሃነት ጋር የተያያዙ ተግዳሮቶች ሲገጥሟቸው፣ መድብለ-ባህላዊ ትምህርት በንድፈ-ሀሳብ እና በተግባር ዘወትር አዳዲስ ትርጉሞችን እየያዘ የመጣ ሲሆን፣ በባለ-ብዙ-ባህል ማህበረሰቦች ውስጥ ስለ ሰብአዊ መብቶች፣ ማህበራዊ ፍትህ እና ውጤታማ የሥርዓተ-ትምህርት አተገባበር ዋነኛ የክርክር መድረክ ሆኖ ቀጥሏል።

ጥልቅ በሆነ የባህል፣ የቋንቋ እና የብሔር ብዝሃነት የምትታወቀው ኢትዮጵያ፣ የመድብለ-ባህላዊ ሥርዓተ-ትምህርት ማሻሻያ አስፈላጊነትን ከተገነዘበች ቆይታለች። የ 2018 የትምህርት ፍጥ-ካርታ እና የከፍተኛ ትምህርት ስትራቴጂዎችን ጨምሮ የቅርብ ጊዜ ብሔራዊ ፖሊሲዎች፣ አንድነት ብዝሃነት፣ ፍትሃዊ ተደራሽነት፣ አግባብነት እና ጥራት ላይ ትኩረት ይሰጣሉ። ይሁን እንጂ፣ እነዚህ ቁርጠኝነቶች ቢኖሩም፣ የኢትዮጵያ የመንግሥት ዩኒቨርሲቲዎች አሁንም የብሔር ውጥረቶችን፣ የፖለቲካ ዋልታ ረገጥነትን እና በሥርዓተ-ትምህርት ፖሊሲውና በክፍል ውስጥ ትግበራ መካከል ያለውን ሰፊ ልዩነት እያስተናገዱ ይገኛሉ። ጥናቶች በተከታታይ እንደሚያሳዩት፣ የአካዳሚክ ሰራተኞች የመድብለ-ባህላዊ እይታዎችን ውጤታማ በሆነ መንገድ ለመተግበር የሚያስችል ግንዛቤ፣ ክህሎት እና የሥነ-ማስተማር (pedagogical) ዝግጁነት ይጎድላቸዋል። ይህም የሥርዓተ-ትምህርት ውህደት ውስን እንዲሆን፣ በቂ የመድብለ-ባህላዊ ፕሮግራሞች እንዳይኖሩ እና የመማር-ማስተማር ምላሽ ሰጪነት ዝቅተኛ እንዲሆን አድርጓል። እነዚህ ተግዳሮቶች የአካዳሚክ ሰራተኞችን ቁርጠኝነት መገምገም፣ መዋቅራዊ እንቅፋቶችን መለየት እና በኢትዮጵያ የመንግሥት ዩኒቨርሲቲዎች ውስጥ መድብለ-

ባህላዊ ሥርዓተ-ትምህርትን ለመተግበር ያለውን ተስፋ ማጠናከር አስቸኳይ ጉዳይ መሆኑን ያሳያሉ።

አቀራረቦች እና ውጤቶች

ጥናቱ በዋናነት መጠናዊ (quantitative) መረጃዎችን በመጠቀም፣ ገላጭ የዳሰሳ ጥናት (cross-sectional descriptive survey) ዘዴን ተከትሏል። መረጃዎቹም በምሥራቅ ኢትዮጵያ የመንግሥት ዩኒቨርሲቲዎች ውስጥ ለሚገኙ 151 የአካዳሚክ ሰራተኞች በተበተነ ራስ-መጠይቅ (self-administered questionnaire) ተሰብስበዋል። ተገቢውን ውክልና ለማረጋገጥም የደረጃማ (stratified) እና ድንገተኛ (simple random) የናሙና አመራረጥ ዘዴዎች ጥቅም ላይ ውለዋል። የመመዘኛ ዘዴው አስተማማኝነት (reliability) በቅድመ-መከራ (pilot test) ተረጋግጦ በክሮንባች አልፋ (Cronbach's alpha) ተፈትሷል። የመረጃ ትንተናውም የመድብለ-ባህላዊ ሥርዓተ-ትምህርት አተገባበርን፣ የአካዳሚክ ሰራተኞችን ቁርጠኝነት እና የጾታ ልዩነትን ለመመርመር ገላጭ ስታቲስቲክስ (አማካይ እና መደበኛ ልዩይት) እንዲሁም ደጋፊ (inferential) ቴክኒኮችን (t-tests እና one-way ANOVA) ተጠቅሟል።

ጥናቱ እንዲረጋገጠው በምሥራቅ ኢትዮጵያ የመንግሥት ዩኒቨርሲቲዎች ውስጥ ያለው የመድብለ-ባህላዊ ሥርዓተ-ትምህርት አተገባበር አጠቃላይ ሁኔታ ዝቅተኛ ነው።

በዋና ዋና አመልካቾች ላይ የተመዘገበው አጠቃላይ አማካይ ውጤት $M = 2.097/5$ ፣ $SD = 1.09$ ሲሆን፣ ይህም በክፍል ውስጥ ትምህርት ላይ የመድብለ-ባህላዊ እይታዎች ውህደት በቂ አለመሆኑን ያሳያል። በተለይም የመድብለ-ባህላዊ የመማሪያ ክፍል ተግዳሮቶችን መወጣት፣ ለባህላዊ ልዩነቶች መቻቻልን መፍጠር፣ ዓለም አቀፋዊ ጉዳዮችን ከትምህርቱ ጋር ማዋሃድ እና ለባህል ምላሽ ሰጪ የሆኑ የማስተማር ዘዴዎችን (culturally responsive pedagogy) መተግበር ዝቅተኛውን የአማካይ ውጤት ያስመዘገቡ ነጥቦች ናቸው። ይህም እነዚህ ወሳኝ ተግባራት ከአካዳሚክ ሰራተኞችም ሆነ ከዩኒቨርሲቲ አመራሮች የተሰጣቸው ትኩረት አነስተኛ መሆኑን ያሳያል። በአንጻሩ ማስተማርን ከተለያዩ ተማሪዎች ፍላጎት ጋር ማስማማት፣ የብሔር ተኮር አስተሳሰቦችን (stereotyping) መቀነስ፣ ብዝሃነትን የሚያንፀባርቁ የተውኔት (role-play) ዘዴዎችን መጠቀም፣ የመድብለ-ባህላዊ ዝግጅቶችን ማደራጀት እና ለመቻቻል የቡድን ስራን ማበረታታት የመሳሰሉት ተግባራት መካከለኛ አፈጻጸም የታየባቸው ቢሆንም፣ በተቋም ደረጃ ትርጉም ባለው መልኩ ስር ሰደዋል ለማለት ግን በቂ አይደሉም። በአጠቃላይ እነዚህ ውጤቶች የሚያሳዩት የተወሰኑ የመድብለ-ባህላዊ አካላት ቢኖሩም፣ በዩኒቨርሲቲዎቹ ውስጥ ወጥነት፣ ጥልቀት እና ስልታዊ አተገባበር እንደሚጎድላቸው ነው።

ሠንጠረዥ 1፡ በምሥራቅ ኢትዮጵያ የመንግሥት ዩኒቨርሲቲዎች የመድብለ-ባህላዊ ሥርዓተ-ትምህርት አተገባበር ሁኔታ

የተግባር አመልካቾች	ብዛት (በቁጥር)	አማካይ (M)	ስታንዳርድ ዲቪዬሽን (SD)	ትርጓሜ
የመድብለ-ባህላዊ መማሪያ ክፍል ተግዳሮቶችን መወጣት	151	2.94	1.034	መካከለኛ
ማስተማርን ከተማሪዎች ብዝሃነት ጋር ማስማማት	151	3.11	1.006	መካከለኛ
ለባህላዊ ልዩነቶች መቻቻልን መፍጠር	151	2.92	0.97	ዝቅተኛ
የብሔር ተኮር አመለካከቶችን (Stereotyping) መቀነስ	151	3.2	1.02	መካከለኛ
የተለያዩ ማንነቶች እንዲገለጹ ማበረታታት	151	3.92	1.03	መካከለኛ
ብዝሃነትን የሚያንፀባርቁ የተውኔት (Role-play) ዘዴዎችን መጠቀም	151	3.06	1.02	መካከለኛ
ዓለም አቀፋዊ ጉዳዮችን ከሥርዓተ-ትምህርቱ ጋር ማዋሃድ	151	2.22	1.091	ዝቅተኛ
የመድብለ-ባህላዊ ዝግጅቶችን ማደራጀት	151	3.03	0.99	መካከለኛ
ለባህል ምላሽ ሰጪ የሆኑ የማስተማር ዘዴዎችን መተግበር	151	2.12	1.06	ዝቅተኛ
ለመቻቻል የቡድን ሥራን መፍጠር	151	3.18	1.02	መካከለኛ

የአካዳሚክ ሰራተኞችን ተሳትፎ በተመለከተ፣ ውጤቶቹ እንደሚያሳዩት ለመድብለ-ባህላዊ ሥርዓተ-ትምህርት አተገባበር ያላቸው ቁርጠኝነት ዝቅተኛ ሆኖ ቀጥሏል። ምንም እንኳን የተመዘገበው አጠቃላይ አማካይ ውጤት ($M = 23.81$) ከተጠበቀው መካከለኛ ነጥብ ($M = 24.5$) ጋር ቢቀራረብም፣ የቲ-ቴስት (t -test) ውጤቶች እንደሚያሳዩት የመምህራን ቁርጠኝነት ስኬታማ አተገባበርን ለማረጋገጥ በቂ አይደለም። ግኝቶቹ እንደሚጠቁሙት፣ መምህራን በንድፈ-ሀሳብ ደረጃ ለመድብለ-ባህላዊ ትምህርት አዎንታዊ አመለካከት ሊኖራቸው ቢችሉም፣ ብዙዎቹ ግን መድብለ-ባህላዊ እይታዎችን ከማስተማር ስራቸው ጋር ውጤታማ በሆነ መንገድ ለማዋሃድ የሚያስፈልጋቸው ተግባራዊ ክህሎት፣ የሥነ-ማስተማር (pedagogical) ዝግጁነት፣ የይዘት እውቀት እና ተነሳሽነት ይጎዳላቸዋል። ይህ በእምነት እና በተግባር መካከል ያለው ክፍተት (gap between belief and practice) የታለመ የሙያ ማሻሻያ ስልጠና እና ተቋማዊ ድጋፍ እጅግ አስፈላጊ መሆኑን ያሳያል።

ጥናቱ በተጨማሪም የስነ-ህዝብ ሁኔታዎች፣ በተለይም ጾታ፣ በመድብለ-ባህላዊ ሥርዓተ-ትምህርት አተገባበር ላይ ተጽዕኖ ማሳረፍ አለማሳረፋቸውን መርምሯል። የአንድ አቅጣጫ የልዩነት ትንተና (One-way ANOVA) ውጤት እንደሚያሳየው፣ በወንድ እና በሴት አካዳሚክ ሰራተኞች መካከል በአተገባበር ደረጃ ረገድ በስታቲስቲክስ የሚታይ የጎላ ልዩነት የለም ($F(22,128)=0.879$, $p=.621$)፤ ይህም ሁለቱም ወገኖች ተመሳሳይ ገደቦችና ተግዳሮቶች እንደሚገጥሟቸው ይጠቁማል። ይህ ግኝት የሚያሳየው አተገባበሩን የሚያደናቅፉ እንቅፋቶች ከጾታ ጋር የተያያዙ ሳይሆኑ በተቋማቱ ውስጥ ካሉ ሰፊ ስልታዊ (systemic) ችግሮች የሚመነጩ መሆናቸውን ነው። ከእነዚህ የመጠናዊ ጥናት ግኝቶች በተጨማሪ፣ ጥናቱ ውጤታማ የመድብለ-ባህላዊ ሥርዓተ-ትምህርት አተገባበርን የሚያሰናክሉ በርካታ ዋና ዋና እንቅፋቶችን ለይቷል። እነዚህም፦ በቂ የመድብለ-ባህላዊ ፕሮግራሞች እና ኮርሶች አለመኖር፣ ውስን ግንዛቤ፣ ለመድብለ-ባህላዊ እንቅስቃሴዎች የሚሰጠው እውቅና አነስተኛ መሆን፣ በዘርፉ የሰለጠኑ ባለሙያዎች እጥረት እና አስፈላጊ የሆኑ የማስተማሪያ ቁሳቁሶች አለመሟላት ናቸው። የአመራር ቁርጠኝነትም ደካማ ሆኖ የተገኘ ሲሆን፣ የዩኒቨርሲቲ አስተዳዳሪዎች የመድብለ-ባህላዊ ልምዶችን ለማጠናከር የሚሰጡት ትኩረት በቂ

አይደለም። ከብሔር ክፍፍል ስጋት እና ከብሔር ፌዴራሊዝም ጋር በተያያዙ የተሳሳቱ ትርጉሞች ምክንያት የመድብለ-ባህላዊነት ጉዳይ ፖለቲካዊ መልክ መያዙ፣ ብዝሃነትን የሚያረጋግጡ ሥርዓተ-ትምህርቶችን ለማስተዋወቅ የሚደረገውን ጥረት ይበልጥ ውስብስብ ያደርገዋል። እነዚህ ተቋማዊ እና አካባቢያዊ ተግዳሮቶች በጥቅሉ የችግሩን መዋቅራዊ ባህሪ የሚያሳዩ ሲሆን፣ በአመራር፣ በሰራተኞች ልማት እና በሥርዓተ-ትምህርት ቀረጻ ረገድ የተቀናጀ ጣልቃ-ገብነት እንደሚያስፈልግ ይጠቁማሉ።

የፖሊሲ ምክሮች

- የከፍተኛ የትምህርት ተቋማት (HEIs) በአካዳሚያዊ እና ከመደበኛ ትምህርት ውጪ በሆኑ መድረኮች የባህል ብዝሃነትን በአግባቡ ማስተናገድ የሚችሉ እንዲሁም ለሀገራዊና ለዓለም አቀፋዊ ዕድገት አስተዋጽኦ የሚያበረክቱ ዜጎችን የማፍራት ኃላፊነታቸውን ሊገነዘቡ ይገባል።
- የትምህርት ሚኒስቴር (MoE) የከፍተኛ ትምህርት ሥርዓተ-ትምህርቶችን እና ስልቴጂዎችን በመቅረጽ፣ በማበልጸግ እና በመገምገም ረገድ ተገቢውን ትኩረት ሊሰጥ ይገባል። እንዲሁም በኢትዮጵያ የመንግሥት ዩኒቨርሲቲዎች ውስጥ የመድብለ-ባህላዊነት እና የብዝሃነት ጉዳዮች ሙሉ በሙሉ መተግበራቸውንና ክትትል መደረጉን የሚያረጋግጡ ስልጠናዎችንና አስፈላጊ ግብዓቶችን ማቅረብ ይኖርበታል።
- የትምህርት ሚኒስቴር የመድብለ-ባህላዊ ፕሮግራሞችን ቀረጻ ለማሻሻል እና ከባህል ጋር የተዛመዱ የማስተማሪያ ቁሳቁሶችን ለማቅረብ ቅድሚያ መስጠት አለበት። የፕሮግራሞችን እድገት የሚመሩ ብሔራዊ የመድብለ-ባህላዊ ትምህርት ማዕቀፎች ሊዘረጉ የሚገባ ሲሆን፣ ዩኒቨርሲቲዎችም ውጤታማ የመድብለ-ባህላዊ ትምህርት አተገባበር እንዲኖር ሀብቶቻቸውን በጋራ በመጠቀም ሊተባበሩ ይገባል።
- የትምህርት ሚኒስቴር ከዩኒቨርሲቲ አመራሮች ጋር በመሆን፣ በከፍተኛ ትምህርት ተቋማት ውስጥ የመድብለ-ባህላዊ ትምህርት እሴቶችን እና አስፈላጊነትን ለማጎልበት ለአካዳሚክ መሪዎች፣ ለሰራተኞች፣ ለተማሪዎች እና ለባለድርሻ አካላት የሚሆኑ አጠቃላይ መመሪያዎችን ማዘጋጀት ይኖርበታል።
- የባህል እና ስፖርት ሚኒስቴር በትምህርት ቤቶችም ሆነ ከትምህርት ቤት ውጪ ባሉ አካባቢዎች መድብለ-ባህላዊነትን ለማሳደግ የተለያዩ ባለድርሻ አካላትን ጥረት ማስተባበር፣ መመሪያ መስጠት፣ እንዲሁም የቁሳቁስና የፋይናንስ ድጋፎችን ማመቻቸት ይኖርበታል።



ሐረማያ ዩኒቨርሲቲ

የምርምር ጉዳዮች ጽ/ቤት

የፖሊሲ መግለጫ 5.1
ግንቦት 2018

የምርምር ትኩረት መስክ



የተቀናጁ የአየር ንብረት-አቀፍ አሰራሮችን በመጠቀም ደህንነትን እና የመቋቋም አቅምን ማሳደግ፡- ከምስራቅ ሐረርጌ፤ ኢትዮጵያ የተገኙ ግንዛቤዎች

ጃፊር ሙሜ አህመድ¹ ፣ ጀማ ሃጂ² ፣ ሞቲ ጃለታ³ ፣ እና ከድር ጀማል²

¹የአፍሪካ የአየር ንብረት-ዘላቂ ግብርና እና የብዝሃ-ህይወት ጥበቃ አፍሪካ የልህቀት ማዕከል፤ ሐረማያ ዩኒቨርሲቲ፤ ኢትዮጵያ

²የእርሻ አኮኖሚና እርሻ ቢዝነስ ትምህርት ቤት፤ ሐረማያ ዩኒቨርሲቲ፤ ኢትዮጵያ

³ዓለም አቀፍ የበቆሎ እና የስንዴ ማሻሻያ ማዕከል ፣ አዲስ አበባ፤ ኢትዮጵያ

ቁልፍ መልዕክቶች

- እንደ ተፈጥሮ ሀብት ጥበቃ ግብርና፤ የአፊር ለምነት አያያዝ እና የሰብል ብዝሃነትን የመሳሰሉ የአየር ንብረት-ለማጅ አሰራሮችን የተገቡ አባወራዎች እና እማወራዎች፤ ካልተገቡት ጋር ሲነፃፀሩ እስከ 73% የሚደርስ ከፍተኛ የፍጆታ ወጪ ሊያገኙ ችለዋል። ይህም የኑሮ ደረጃቸው በከፍተኛ ሁኔታ መሻሻሉን ያሳያል።
- የተቀናጀ የአፊር ለምነት አስተዳደርን መጠቀም የአመጋገብ ስርዓትን ወይም የምግብ አይነቶችን ብዝሃነት በ43.7% አሻሽሏል። በተጨማሪም የተፈጥሮ ማዳበሪያን (የእንስሳት ፍግ) ከኬሚካል ማዳበሪያ ጋር አቀናጅቶ መጠቀም የአንድን አባወራ ዓመታዊ ገቢ በአማካይ በ41,938 የኢትዮጵያ ብር ከፍ አድርጎታል።
- ትምህርት፣ የግብርና ኤክስቴንሽን ድጋፍ፣ የቤት እንስሳት ባለቤትነት እና ወቅታዊ የአየር ንብረት መረጃ ማግኘት አርሶ አደሮች እነዚህን ቴክኖሎጂዎች እንዲጠቀሙ የሚያነሳሱ ዋና ዋና ምክንያቶች ናቸው። በአንጻሩ ከገበያ መራቅ ቴክኖሎጂዎቹን በስፋት ለመጠቀም እንደ ዋነኛ እንቅፋት ሆኖ ቀጥሏል።

መግቢያ

የአየር ንብረት ለውጥ በዓለም አቀፍ ደረጃ የግብርና ምርታማነትን በእጅጉ እየነዳ ያለ ሲሆን፤ በዓለም ዙሪያ ለሚገኙ የምግብ ሥርዓቶችም አንዱና ዋነኛው ፈተና ሆኗል። እንደ ድርቅ ያሉ የአየር ንብረት ድንገተኛ አደጋዎች የሰብል ምርትንና የአባወራዎችን ገቢ በከፍተኛ ሁኔታ በመቀነስ ለምግብ ዋስትና እጦትና ለደህንነት መታወክ ምክንያት

ይሆናሉ። ከሰሃራ ቦታች ባሉ የአፍሪካ ሀገራት የግብርና ምርታማነት ከዓለም አቀፍ አማካይ ቦታች ሆኖ የሚገኘው፤ ዘርፉ ለአየር ንብረት መዛባት እጅግ ተጋላጭ በመሆኑ እና ግብርናው ሙሉ በሙሉ በዝናብ ላይ ጥገኛ በመሆኑ ነው። ብዙውን ጊዜ ከረጅም ጊዜ የዝናብ አማካይ መዛባት ጋር ተያይዘው የሚገለጹ የአየር ንብረት ድንገተኛ አደጋዎች በኢትዮጵያ ውስጥ ድግግሞሻቸው እየጨመረና መጠናቸውም እየበረታ መጥቷል። እነዚህ ሁኔታዎች የምግብ ዋስትና እጦትን ከማባባሳቸውም በላይ፤ የውሃ አቅርቦትን በመቀነስ እና የግብርና ምርትን በማዳከም ረገድ ከፍተኛ ተፅዕኖ አሳድረዋል፤ ይህም ችግር በባህላዊ የአዝመራ አሰራሮች ሳቢያ ይበልጥ እንዲከፋ ሆኗል። በዚህም ምክንያት፤ የአባወራዎች የፍጆታ ወጪ ለዝናብ መለዋወጥ እጅግ ተጋላጭ ሆኗል፤ ይህም የመላመድ ስልቶች በአስቸኳይ እንደሚያስፈልጉ ያሳያል። በሀገሪቱ ውስጥ በተደጋጋሚ የሚከሰተው ድርቅ በሚሊዮኖች የሚቆጠሩ ሰዎችን የነዳ ሲሆን፤ በኦሮሚያ ክልል ብቻ ከ7.5 ሚሊዮን በላይ ሰዎችን ለችግር ዳርጓል። በተለይም ለድርቅ ተጋላጭ በሆነው በምስራቅ ሐረርጌ አካባቢ፤ ተደጋጋሚ የእርጥበት እጥረት የማህበረሰቡን የመቋቋም አቅም በማዳከም ለከፋ ድህነት አጋልጦታል።

እንደ ተፈጥሮ ሀብት ጥበቃ ግብርና፤ የተቀናጀ የአፊር ለምነት አያያዝ እና የሰብል ብዝሃነት ያሉ የአየር ንብረት-ለማጅ የግብርና አሰራሮች፤ የአርሶ አደሩን የመቋቋም አቅም ለማሳደግ፤ ምርታማነትን ለመጨመር እና ድህነትን ለመቀነስ ተስፋ ሰጭ አማራጮች ናቸው። በተጨማሪም የታዩ

ማስረጃዎች እንደሚሳዩት፣ እነዚህን አሰራሮች መተግበር የአየር ንብረት ስጋቶችን ከመቀነሱም በላይ የአባወራዎችን የምግብ ፍጆታ፣ የአመጋገብ ብዝሃነትን እና ገቢን ያሻሽላል። ይሁን እንጂ በኢትዮጵያ በተለይም እንደ ምስራቅ ሐረርጌ ባሉ ለድርቅ ተጋላጭ በሆኑ አካባቢዎች የእነዚህ ቴክኖሎጂዎች ተፈጻሚነት አሁንም ዝቅተኛ ነው። በመሆኑም ይህ ጥናት የሚከተሉትን ሁለት ዋና ጥያቄዎች ይመልሳል፦

1ኛ አርሶ አደሮች እነዚህን አሰራሮች እንዳይተገብሩ ተፅዕኖ የሚያሳድሩ ምክንያቶች ምንድን ናቸው?

2ኛ እነዚህን አሰራሮች መተግበር በድርቅ ሁኔታ ውስጥ የአባወራዎችን ደህንነት ያሻሽላል? የጥናቱ ዋና መላምት፣ የአየር ንብረት-ለማጅ ግብርናን መተግበር በአየር ንብረት ምክንያት የሚመጡ ኪሳራዎችን በመቀነስ የአባወራዎችን የፍጆታ ወጪ ይጨምራል የሚል ነው።

አቀራረቦች እና ውጤቶች

ጥናቱ በምስራቅ ሐረርጌ ዞን በጎሮ-ጉቱ፣ ጉርሱም፣ ባቢሌ እና ቀርሳ ወረዳዎች የተካሄደ ሲሆን፣ ከ430 አርሶ አደር

አባወራዎች የተሰበሰበ መረጃና ድርቅ እየጨመረ መምጣቱን የሚያረጋግጥ የ30 ዓመታት የዝናብ መዝገብን ተጠቅሟል። በጥናቱ የተገመገሙት አሰራሮች ሰብልን አቀላቅሎ መዝራትንና ማፈራረቅን የሚያካትተው የተፈጥሮ ሀብት ጥበቃ ግብርና፣ የተፈጥሮ ሰው ሠራሽ ማዳበሪያን ከአፈር ጥበቃ ጋር የሚያቀናጅው የተቀናጀ የአፈር ለምነት አያያዝ፣ እንዲሁም ድርቅን የሚቋቋሙ ሰብሎችን ማምረትን የሚመለከተው የሰብል ብዝሃነት ናቸው። የአርሶ አደሩ ደህንነት በነፍስ ወከፍ የፍጆታ ወጪ፣ በአመጋገብ ብዝሃነትና በእርሻ ገቢ የተለካ ሲሆን፣ ድህነት በሀገሪቱ የድህነት ወለል፣ የመቋቋም አቅም ደግሞ አርሶ አደሮች በድርቅ ወቅት ያላቸውን የመቋቋም ብቃት በሚያሳይ ጥቅል ውጤት ተገምግሟል። በመጨረሻም የአየር ንብረት-ለማጅ ግብርና አሰራሮችን ተግባራዊነት የሚወስኑ ሁኔታዎችንና ተፅዕኖዎቻቸውን ለመተንተን ልዩ ልዩ የኢኮኖሚክስ ሞዴሎች ጥቅም ላይ ውለዋል።

ሠንጠረዥ 1፡ የተለያዩ የአየር ንብረት-ለማጅ አሰራሮችን መተግበር በድህነት እና በደህንነት ላይ ያለው ተፅዕኖ

የውጤት ተለዋዋጭ	CSAP ጥቅሎች	የአርሶ አደሩ ውሳኔ		
		መተግበር/መቀበል	ያለመተግበር/ያለመቀበል	የለውጥ ተፅዕኖ
		የተጠቃሚዎች ውጤት	ካልተጠቀሙ የሚገኝ ውጤት	ATT
የቤተሰቦች የአመጋገብ ልዩነት ነጥብ	C ₁ E ₀ F ₀	6.208	4.511	1.696***
	C ₀ E ₁ F ₀	5.652	3.181	2.471***
	C ₀ E ₀ F ₁	5.706	5.403	0.303
	C ₁ E ₁ F ₀	6.229	5.860	0.369***
	C ₁ E ₀ F ₁	4.333	2.729	1.604***
	C ₀ E ₁ F ₁	4.571	3.581	0.989***
	C ₁ E ₁ F ₁	6.047	5.529	0.517***
ገቢ	C ₁ E ₀ F ₀	32021.67	6987.05	25034.61***
	C ₀ E ₁ F ₀	31033.91	24360.08	6673.83***
	C ₀ E ₀ F ₁	7347.06	15637.69	11709.37
	C ₁ E ₁ F ₀	29603.64	19583.34	10020.3***
	C ₁ E ₀ F ₁	41938.1	21805.1	20133***
	C ₀ E ₁ F ₁	31941.43	6717.17	25224.26***
	C ₁ E ₁ F ₁	34508.98	7714.87	16794.11***
የነፍስ ወከፍ ፍጆታ ወጪ	L ₁ R ₀ M ₀	8472.77	7647.52	825.25**
	L ₀ R ₁ M ₀	10506.05	10289.19	216.86
	L ₀ R ₀ M ₁	13743.27	5550.57	8192.69***
	L ₁ R ₁ M ₀	9014.54	.10 (309)	1297.43***
	L ₁ R ₀ M ₁	9525.36	5591.76 (373.49)	3933.60***
	L ₀ R ₁ M ₁	11524.72	8592.27 (466.28)	2932.44***
	L ₁ R ₁ M ₁	14659.94	3911.73 (927.65)	10748.21***

ማስታወሻ፦ ብስባሽ (C) ፣ የአፈር መሸርሸር ኮር (E) ፣ ማዳበሪያ (F) ፣ ኢንተርኬፕፕ (L) ፣ ማሽከርከር (R) ፣ ሙልቺንግ (M)።

የዝናብ መዝገቦች እና የአርሶ አደሮች ሪፖርቶች እንደሚያረጋግጡት፣ በጥናት አካባቢው ድርቅ ይበልጥ ተደጋጋሚ እና ከባድ እየሆነ መጥቷል፤ ይህም እየበረታ የመጣውን የአየር ንብረት ጫና ያሳያል። የአየር ንብረት-ለማጅ አሰራሮች ተፈጻሚነት ከትምህርት፣ ከኤክስቴንሽን አገልግሎት፣ ከወቅታዊ የአየር ንብረት መረጃ እና ከአንስሳት ሀብት ባለቤትነት ጋር ጠንካራ ቁርኝት ያለው ሲሆን፣ የገበያ ርቀት እና የግብዓት እጥረት ደግሞ ዋነኛ እንቅፋቶች ሆነው ተገኝተዋል። የተፈጥሮ ሀብት ጥበቃ ግብርና ዓመታዊ የፍጆታ ወጪን በ36.3% የጨመረ ሲሆን፣ የተለያዩ አሰራሮችን አቀናጅቶ (በጥቅል) መጠቀም ደግሞ ይህንን ጥቅም ወደ 73.3% በማሳደግ ድህነትን በከፍተኛ ሁኔታ ቀንሷል (ሠንጠረዥ 1)። የተቀናጀ የአፈር ለምነት አያያዝ የአመጋገብ ብዝሃነትን በ43.7% ሲያሻሽል፣ የተፈጥሮ ማዳበሪያን ከኬሚካል ማዳበሪያ ጋር አቀናጅቶ መጠቀም ደግሞ ገቢን በ41,938 የኢትዮጵያ ብር አሳድሯል። ቢያንስ 40% የእርሻ መሬታቸውን ለተለያዩ ሰብሎች የመደቡ አባወራዎች የተሻለ የድርቅ መቋቋም አቅም ያሳዩ ሲሆን፣ ከፍተኛው የመቋቋም ውጤት የተመዘገበው የተቀናጁ አሰራሮችን በተገቢሩት ዘንድ ነው። በአጠቃላይ፣ አሰራሮችን አቀናጅቶ መተግበር ነጠላ አሰራሮችን ከመጠቀም የላቀ ውጤት ያስገኘ ሲሆን፣ ይበልጥ ጠንካራ እና አስተማማኝ የደህንነት እና የመቋቋም አቅም ጥቅሞችን አስገኝቷል።

የፖሊሲ ምክሮች

- የግብርና ሚኒስቴር እና የክልል ግብርና ቢሮዎች፣ አርሶ አደሮች የሚገኘውን ጥቅምና የመቋቋም አቅም ከፍ ለማድረግ የተፈጥሮ ሀብት ጥበቃ ግብርናን፣ የአፈር ለምነት አያያዝን እና የሰብል ብዝሃነትን በጥምረት እንዲተገብሩ ማበረታታት አለባቸው።
- የግብርና ሚኒስቴር፣ የኢትዮጵያ ሚኒስቴሮች ኢንስቲትዩት እና ሌሎች የሚመለከታቸው አካላት የአጭር የጽሑፍ መልዕክት (SMS)፣ ሬዲዮ እና የአርሶ አደር መረቦችን በመጠቀም ለአካባቢው ተጨባጭ ሁኔታ የሚስማሙ የአየር ንብረት መረጃዎችን እና ቅድመ ማስጠንቀቂያዎችን ለአርሶ አደሩ በማቅረብ የአየር ንብረት-ለማጅ ተነሳሽነቶችን መደገፍ ይኖርባቸዋል።
- የፌዴራል እና የክልል የዘር ድርጅቶች (ኢንተርፕራይዞች)፣ የኅብረት ሥራ ማህበራት ዩኒየኖች እና ሌሎች የሚመለከታቸው ድርጅቶች አርሶ አደሮች ሰብሎችን በስፋት ማምረት እንዲችሉ ድርቅን የሚቋቋሙ የተረጋገጡ ምርጥ ዘሮችን እና አስፈላጊ ግብዓቶችን በቀላሉ የሚያገኙበትን መንገድ ማመቻቸት አለባቸው።
- የግብርና ኤክስቴንሽን ባለሙያዎች ለልማት ጣቢያ ሠራተኞች በአየር ንብረት-ለማጅ ግብርና አተገባበር፣ በአየር ንብረት አደጋ ስጋት አመራር እና ለአርሶ አደሮች በሚሰጡ የምክር አገልግሎቶች ዙሪያ ብቃትን መሠረት ያደረገ ስልጠና መስጠት ይኖርባቸዋል።



ሐረማያ ዩኒቨርሲቲ

የምርምር ጉዳዮች ጽ/ቤት

የፖሊሲ መግለጫ 6.1
ግንቦት 2018

የምርምር ትኩረት
መስክ

VI

የመሬት መንቀጥቀጥ ስጋት ባለባቸው የዩኒቨርሲቲ ግቢዎች ብሔራዊ የግንባታ መመሪያዎችን ለማዘመን የቀረበ ጂኦ-ፊዚካዊ ማስረጃ፡- ከሐረማያ ዩኒቨርሲቲ የተገኘ ግንዛቤ

በቀሉ አበባ¹፣ ገላና አመንቴ¹፣ እና ሃና ተሾመ¹

¹የፌዝክስ ትምህርት ክፍል፣ የተፈጥሮ እና ስነ ቀመር ሳይንስ ኮሌጅ፣ ሐረማያ ዩኒቨርሲቲ፣ ኢትዮጵያ

ቁልፍ መልዕክቶች

- በጂኦ-ፊዚካዊ ቅኝት በሐረማያ ዩኒቨርሲቲ ዋና ግቢ ስር የተደበቁ እና ንቁ የሆኑ ስምጥ መስመሮች (Active fault zones) ተለይተዋል።
- ዝቅተኛ የመቋቋም አቅም (Low-resistivity) ባላቸው የደለል ንጣፎች እና ስንጥቆች የተሞሉ በርካታ መዋቅራዊ ድክመት ያለባቸው ቀጠናዎች ተገኝተዋል፤ እነዚህም አነስተኛ መጠን ያላቸውን የመሬት መንቀጥቀጥ ንዝረቶች እንኳን የማጉላት (Amplify) ባህሪ አላቸው።
- በዩኒቨርሲቲው ግቢ ማዕከላዊ (ፕሮፋይል 3) እና ደቡብ ምስራቅ (ፕሮፋይል 4) ክፍሎች ውስጥ ጥልቀት የሌላቸው ስንጥቆች እና ደካማ የጂኦሎጂካል ግንኙነቶች ተገኝተዋል፤ ይህም እነዚህን ቦታዎች ለወደፊት ግንባታ የማይመቹ ያደርጋቸዋል።
- የማግኔቲክ አኖማሊ ካርታዎች፣ የጥልቀት መለኪያዎች (Pseudo-depth sections) እና የሁለት-ደረጃ (2D) ሞዴሊንግ ውጤቶች መሬት ውስጥ ደካማ ቀጠናዎችና የስምጥ መስመሮች መኖራቸውን በወጥነት ያረጋግጣሉ፤ ይህም አካባቢው ለከፍተኛ የመሬት መንቀጥቀጥ አደጋ ተጋላጭ መሆኑን ያሳያል።

መግቢያ

የመሬት መንቀጥቀጥ በሰው ሕይወት እና በመሠረተ-ልማት ላይ ከፍተኛ አደጋ ያስከትላል፤ በተለይም እንደ ዋናው የኢትዮጵያ ስምጥ ሸለቆ (Main Ethiopian Rift) ባሉ የጂኦሎጂ አንቅስቃሴ በሚታይባቸው አካባቢዎች አደጋው የከፋ ነው። በምሥራቅ ኢትዮጵያ የሚገኘው የሐረማያ-

ድሬዳዋ ኮሪደር በቅርብ ጊዜ የተመዘገቡ በርካታ የመሬት መንቀጥቀጥ ክስተቶችን አስተናግዷል፤ ለምሳሌ በ2013 (2021 እ.ኤ.አ) ከሐረማያ ዩኒቨርሲቲ በስተሰሜን የተከሰተው የ3.0 ማግኒቲውድ (Mw) መንቀጥቀጥ፣ በድሬዳዋ እና ሐረማያ መካከል የተከሰተው የ4.5 ማግኒቲውድ (Mw) እና በሽኒሌ አቅራቢያ የታየው የ4.3 ማግኒቲውድ (Mw) ክስተት ይጠቀሳሉ። እነዚህ አጋጣሚዎች የአካባቢውን ተጋላጭነት የሚያሳዩ ከመሆናቸውም በላይ፣ አስቀድሞ የመሬት መንቀጥቀጥ ስጋት ግምገማ (proactive seismic risk assessment) ማድረግ እንደሚያስፈልግ ያረጋግጣሉ። የመሬት መንቀጥቀጥ ተፅዕኖ በመሬት ውስጥ ጂኦሎጂ፣ በስምጥ መዋቅሮች (fault structures) እንዲሁም በአፈርና በአለት ንጣፎች ባህሪ ላይ በእጅጉ የተመሰረተ ነው፤ አነስተኛ መጠን ያላቸው ንዝረቶች እንኳን በደለል ክምችቶች፣ በስንጥቆች እና ደካማ ቀጠናዎች ውስጥ በሚያልፉበት ጊዜ ሊጎሉ (amplified) ይችላሉ። የከተማ ማዕከላት እና የዩኒቨርሲቲ ግቢዎች እየሰፉ ሲሄዱ፣ ደህንነቱ የተጠበቀ እና አደጋን የሚቋቋም መሠረተ-ልማት ለመገንባት የስምጥ መስመሮችን እና ያልተረጋጉ የመሬት ውስጥ ሁኔታዎችን መለየት ወሳኝ ጉዳይ ነው።

ሐረማያ ዩኒቨርሲቲ ባለፉት ዓመታት ከፍተኛ የሆነ የመሠረተ-ልማት መስፋፋት ቢያሳይም፣ ከዚህ ጥናት በፊት ግን ከመሬት በታች ስላሉ የስምጥ መዋቅሮች (subsurface fault structures) የተደረገ ስልታዊ የጂኦ-ፊዚክስ ግምገማ አልነበረም። እንደ የመማሪያ ክፍሎች፣ የተማሪዎች መኝታ ቤቶች እና ላብራቶሪዎች ያሉ ሕንፃዎች የተገነቡት ከመሬት በታች ያለውን የስምጥ ካርታ (subsurface fault mapping) ሳይጠቀሙ፣ በላይ ላይ በሚታይ የአፈር ምርመራ (surface-level geotechnical observations) ላይ ብቻ ተመስርቶ ነው።

ይህ ከፍተኛ በንቁ ስምጥ መስመሮች ወይም ደካማ የጂኦሎጂ ቀጠናዎች ላይ የመገንባት አደጋን ይጨምራል። የአሁኑ ጥናት የኤሌክትሪክ መቋቋም (Electrical Resistivity) እና የመግኒቢሳዊ (Magnetic) ዘዴዎችን በአንድ ላይ በመጠቀም ይህንን ወሳኝ ከፍተኛ ይሞላል፤ እነዚህ ዘዴዎች ከመሬት ቦታች ያሉ ጥልቀት የሌላቸው መዋቅሮችን፣ የአለት ዓይነቶችን (lithological variations) እና የተደበቁ ስምጥ መስመሮችን ለመለየት በዓለም አቀፍ ደረጃ የታወቁ ናቸው። ጥናቱ በሐረማያ ዩኒቨርሲቲ ግቢ ስር ያሉ ንቁ ስምጥ መስመሮችን፣ ደካማ ቀጠናዎችን እና የአለት ዓይነቶችን ለመለየት እንዲሁም ለወደፊት ደህንነቱ የተጠበቀ ግንባታ እና የዩኒቨርሲቲ ግቢ ጥላን በማስረጃ የተደገፈ መመሪያ ለመስጠት ያለመ ነው።

አቀራረቦች እና ውጤቶች

የጥናቱ አቀራረብ በዘጠኝ የቁም የኤሌክትሪክ ድምፅ መለኪያዎች (Vertical Electrical Soundings-VES) እና በ398 የመግኒቢሳዊ መለኪያ ነጥቦች ላይ የተመሰረተ ሲሆን፣ እነዚህም መረጃዎች በአራት የጂኦ-ፊዚክስ መስመሮች (profiles) ላይ በPASI 16 GL ኤሌክትሪክ መቋቋም መለኪያ እና በGSM 19T ፕሮቶን ማግኒቶሜትር (PASI 16 GL Earth Resistivity Meter and GSM-19T Proton Magnetometer) አማካኝነት ተሰብስበዋል። የተሰበሰቡት የVES መረጃዎች በWinResist ሶፍትዌር አማካኝነት የአፈር ንጣፎችን መቋቋም (resistivity) እና ውፍረት ለመተንተን የዋሉ ሲሆን፣ የመግኒቢሳዊ መረጃዎች ደግሞ የቀኑ የዓየር ሁኔታ ተጽዕኖ (diurnal variations) ተስተካክሎላቸው በGeosoft Oasis Montaj ሶፍትዌር ሞዴል ተሰርቶላቸዋል። በመጨረሻም የኤሌክትሪክ መቋቋም ከፍሎችን፣ የጥልቀት ካርታዎችን (pseudo depth maps) እና የመግኒቢሳዊ አኖማሊ ካርታዎችን በAutoCAD እና Surfer ሶፍትዌሮች በማቀናጀት ደካማ ቀጠናዎችን፣ የአለት ድንበሮችን እና ሊሆኑ የሚችሉ ስምጥ መዋቅሮችን ለመለየት የተቻለ ሲሆን፣ ለትርጉሙ ይበልጥ ትክክለኛነትም በቁፋሮ የተገኙ የመሬት ውስጥ መረጃዎች (borehole logs) እንደ ማነጻጸሪያ ጥቅም ላይ ውለዋል።

የተቀናጀው የጂኦ-ፊዚክስ ምርመራ ውጤት እንደሚያሳየው፣ በሐረማያ ዩኒቨርሲቲ መሬት ስር በርካታ ደካማ ቀጠናዎች እና ንቁ ሊሆኑ የሚችሉ ስምጥ መስመሮች (faults) የሚገኙ ሲሆን፣ እነዚህም በዋናነት ዝቅተኛ የመቋቋም አቅም ካላቸው የደለል ንጣፎች፣ በሽክላ የበለፀጉ አፈሮች፣ ከተሰነጣጠቁ አለቶች እና ከተዛቡ የጂኦሎጂ ግንኙነቶች ጋር የተያያዙ ናቸው። እነዚህ ቀጠናዎች በተለያዩ መስመሮች ላይ የተከፋፈሉ ሲሆንም፣ በተለይም ፕሮፋይል 3 (የማዕከላዊው ግቢ ዞን) እና ፕሮፋይል 4 (የደቡብ ምስራቅ ግቢ ዞን) በጂኦሎጂካል መዋቅር ረገድ እጅግ ያልተረጋጉ መሆናቸውን

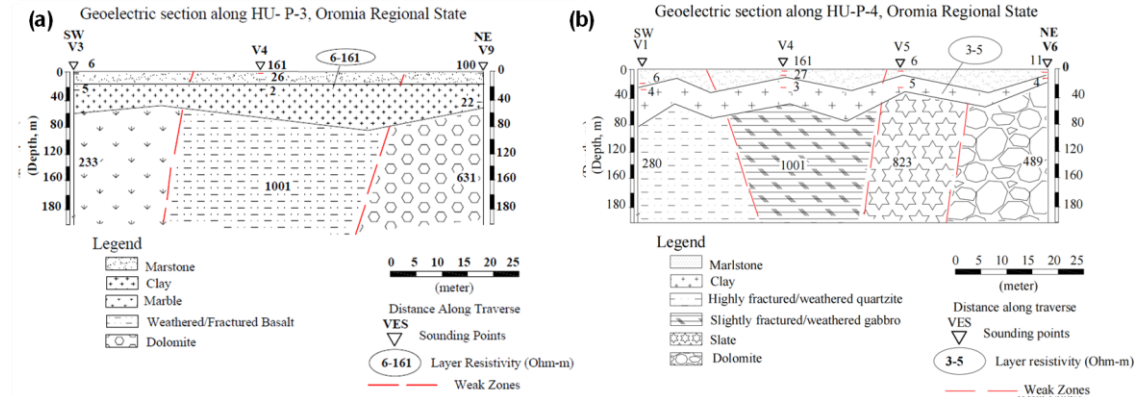
የሚያሳዩ ጠንካራ ማስረጃዎች ተገኝተዋል። በፕሮፋይል 3 ላይ የተካሄደው የኤሌክትሪክ መቋቋም ምርመራ (VES) ሦስት ዋና ዋና ንጣፎችን ያሳየ ሲሆን፣ እነሱም የተሰነጣጠቁ የማርል ድንጋይ የላይኛው ንጣፍ፣ በጣም ዝቅተኛ የመቋቋም አቅም (2–22 Ωm) ያለው ወፍራም የሽክላ ንጣፍ እና ወደ ጥልቀት ሲሄድ ወደ ዶሎማይት፣ ባሳልት እና ማርብል የሚቀየሩ አለቶች ናቸው። ይህ ዝቅተኛ የመቋቋም አቅም እና ከፍተኛ የውሃ ይዘት መኖሩ በታው መዋቅራዊ ድክመት ያለበት እና በስንጥቆች የተሞላ መሆኑን የሚያረጋግጥ ሲሆን፣ የጥልቀት መለኪያ ካርታው (pseudo-depth map) ደግሞ የመሬት ንዝረትን የማጉላት ባህሪ ያላቸውና የመቋቋም አቅማቸው ከ 70 Ωm በታች የሆኑ ሰፊ ቀጠናዎች መኖራቸውን ያረጋግጣል። በተለይም በVES-3 እና VES-4 መካከል ያሉት ቦታዎች በርካታ ጥልቀት የሌላቸው ደካማ ቀጠናዎችን የያዙ በመሆናቸው፣ እነስተኛ የመሬት መንቀጥቀጥ ንዝረቶች እንኳን በከፍተኛ ሁኔታ ሊጠናከሩ እንደሚችሉ ይጠቁማሉ።

ፕሮፋይል 4 ከመጀመሪያው ይበልጥ ግልጽ የሆኑ እና ያልተረጋጉ የጂኦሎጂ ሁኔታዎችን ያሳያል (ምስል 1)። የላይኛው የአፈር ንጣፍ እጅግ በጣም ቀጭን (3 ሜትር) ሲሆን፣ ይህም ጥልቀት የሌለው የአየር ሁኔታ መሸርሸርን (weathering) የሚያንፀባርቅ ነው፤ ሦስተኛው ንጣፍ ደግሞ እንደ ዶሎማይት፣ ስሌት፣ የተሰነጣጠቀ ጋብሮ እና የተሸሸረ ኳርትዛይት ያሉ የተለያዩ የአለት ዓይነቶችን ይዟል። በዚህ ሦስተኛ ንጣፍ ውስጥ በሜካኒካዊ መንገድ ደካማ የሆነውና በጣም የተሰነጣጠቀ የጋብሮ (fractured gabbro) አለት መገኘቱ፣ ከላይኛው ከፍል ጀምሮ ወደ ታች የሚዘልቅ ከፍተኛ የደካማ ቀጠና መኖሩን ይጠቁማል። በተመሳሳይ ሁኔታ በፕሮፋይል 4 ላይ የተሰሩ የጥልቀት ካርታዎች (Pseudo-depth maps) ዝቅተኛ የኤሌክትሪክ መቋቋም (አብዛኛው ከ 60 Ωm በታች) ያላቸው ሰፊ ቦታዎችን ያሳያሉ፤ ይህም የመሬት መንቀጥቀጥ ንዝረትን በማጉላት የሚታወቁትን ባለ ቀዳዳ፣ እርጥበት አዘል ወይም በሽክላ የበለፀጉ ደለል ክምችቶች መኖራቸውን ያረጋግጣል።

የመግኒቢሳዊ አኖማሊ (Magnetic anomaly) (ምስል 1a) ካርታዎች በኤሌክትሪክ መቋቋም ዘዴ የተገኙትን ግኝቶች ይበልጥ ያጠናክራሉ። ቀሪ የአኖማሊ ካርታዎች (Residual anomaly maps) በስፋት የሚታዩ ዝቅተኛ የመግኒቢሳዊ ስርጭት ቀጠናዎችን የሚያሳዩ ሲሆን፣ ይህም የመሬት መሸርሸር የደረሰባቸውን ወይም የደለል አለቶችን መኖሩን ያንፀባርቃል። መጠነኛ ከፍተኛ አኖማሊ የሚታይባቸው ቦታዎች ደግሞ ከአፈር መፈጠር ሂደት (pedogenic processes) ወይም መሬት ውስጥ ካሉ የአሳተ ገሞራ አለቶች (igneous intrusions) ጋር የተያያዙ ሲሆን፣ እነዚህ አኖማሊዎች የአለት ድንበሮችን እና ሊሆኑ የሚችሉ የስምጥ መስመሮችን (fault traces) ለመለየት ያገለግላሉ።

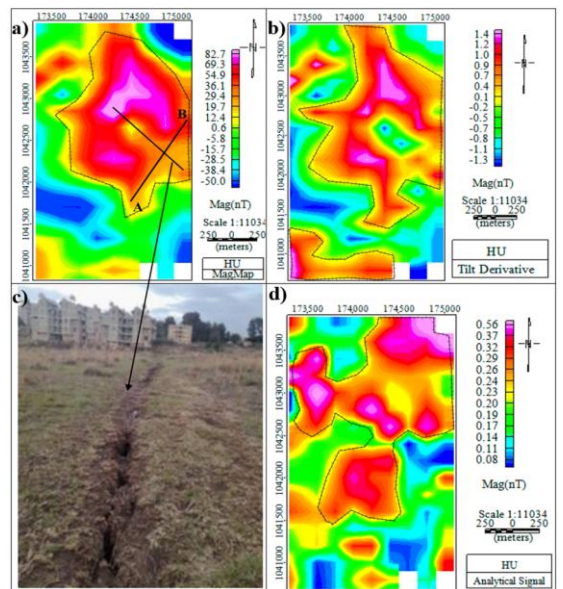
የአናሊቲካል ሲግናል (Analytical Signal) (ምስል 2d) እና የቲልት ደረጃ (Tilt Derivative) ካርታዎች ((ምስል 2b) እንደ ስምጥ መስመር ያሉ ቅርጾችን (lineaments) በግልጽ የሚያሳዩ ሲሆን፤ አብዛኞቹም ከሰሜን ምዕራብ

ወደ ደቡብ ምስራቅ (NW–SE) አቅጣጫ የሚያመሩና ከዩኒቨርሲቲው ግቢ ስር መዋቅራዊ መቋረጥ (structural discontinuities) መኖሩን የሚጠቁሙ ናቸው።



ምስል 2. የጂኦኤሌክትሪክ ክፍል ለመገለጫ-3 (ማዕከላዊ ዞን) (a)፣ ለመገለጫ-4 (የደቡብ ምስራቅ ካምፓስ ዞን) (b)

እነዚህ መዋቅራዊ መቋረጦች ዝቅተኛ እና ከፍተኛ የመግኒቲኒዊ ባህሪ ባላቸው አለቶች መካከል እንደ ድንበር ሆነው የሚያገለግሉ ሲሆን፤ የቲልት ደረጃው ካርታው እነዚህን ግንኙነቶች በተለያዩ ጥልቀቶች ላይ ይለያቸዋል። በተጨማሪም የአይለር ዲኮንቨሎሽን (Euler Deconvolution) ዘዴ ከስምጥ ጋር የተያያዙ ደካማ ቀጠናዎችን ከ138 እስከ 203 ሜትር ጥልቀት ላይ ያረጋገጠ ሲሆን፤ ይህም የመሬት ውስጥ አለመረጋጋት መኖሩን ይበልጥ ያረጋግጣል። በጥቅሉ የተገኘው ማስረጃ እንደሚያሳየው፤ በሐረማያ ዩኒቨርሲቲ ውስጥ የሚገኙ በርካታ ቦታዎች በተለይም የሸክላ ንጣፎች፣ የደለል አለቶች፣ የተሰነጣጠቁ የጋብሮ እና የማርል ድንጋዮች በአንድ ላይ በሚገኙባቸው አካባቢዎች አነስተኛ የመሬት መንቀጥቀጦችን እንዲያሳዩ ይቻላል። እንዲህ ዓይነቱ የጂኦሎጂ አቀማመጥ የመቋቋም አቅሙ ዝቅተኛ በመሆኑ እና በቀላሉ የመቀየር (deform) ባህሪ ስላለው ለከፍተኛ የመሬት መንቀጥቀጥ አደጋ ተጋላጭ እንደሆነ የታወቀ ነው። በዚህም ምክንያት በእነዚህ አካባቢዎች የሚገኙ ማናቸውም አዳዲስ ሕንፃዎች ከመገንባታቸው በፊት ሰፊ የጂኦቴክኒክ ጥናት ሊደረግላቸው ይገባል፤ እንዲሁም በተለይም ደካማ ቀጠናዎች አቅራቢያ የሚገኙ ነባር ሕንፃዎች ለርዕደ መሬት ያላቸውን ተጋላጭነት ለመወሰን ግምገማ ሊደረግላቸው ይገባል።



ምስል 2፡- ሀ) ቀሪ መግኒቲኒዊ ካርታ (Residual magnetic map)፣ ለ) የቲልት ዲሪቨቲቭ ካርታ (Tilt Derivative map)፣ ሐ) በጥናት አካባቢው የሚታዩ የገፅታዎች ሰሜን ምዕራብ-ደቡብ ምስራቅ (NW–SE) አቅጣጫ፣ እና መ) አናሊቲካል ሲግናል ካርታ (Analytical signal map)።

ፖሊሲ ምክረ-ሃሳቦች

- የከተማ ልማት እና ቤቶች ሚኒስቴር የመሬት መንቀጥቀጥ ስጋት ባለባቸው አካባቢዎች በሚገኙ የዩኒቨርሲቲ ግቢዎች ውስጥ ትልልቅ የህንፃ ግንባታ ፕሮጀክቶችን ከማጽደቁ በፊት የኤሌክትሪክ መቋቋም እና መግነጢሳዊ ዳሰሳዎችን ጨምሮ የከርሰ ምድር ጂኦቴክኒካል ግምገማዎችን ማዘዝ አለበት።
- የሐረማያ ዩኒቨርሲቲ የኮንስትራክሽን ፕሮጀክት ጽሕፈት ቤት በጂኦ-ቴክኒካዊ ቅኝት ጥልቀት የሌላቸው ስንጥቆች እና ደካማ የጂኦሎጂ ግንኙነቶች በተገኙባቸው (በፕሮፋይል 3 እና 4) የዩኒቨርሲቲው ማዕከላዊ እና ደቡብ ምስራቅ ክፍሎች ላይ አዳዲስ ህንፃዎችን ከመገንባት መቆጠብ አለበት፤ ምክንያቱም
- የብሔራዊ የአደጋ ስጋት ሥራ አመራር ኮሚሽን የጂኦ-ቴክኒካዊ የስምጥ መስመሮች ካርታን (fault-mapping) በአካባቢያዊ የመሬት መንቀጥቀጥ ዝግጁነት እና በመሬት አጠቃቀም ፕላን መመሪያዎች ውስጥ ማካተት ይኖርበታል።
- የምህንድስና እና የኮንስትራክሽን ድርጅቶች ከዩኒቨርሲቲዎች ጋር የሚሰሩ የኮንስትራክሽን ድርጅቶች የመሬት መንቀጥቀጥን የሚቋቋሙ (seismic-resistant) ደረጃዎችን ማሟላታቸውን ለማረጋገጥ፣ የጂኦ-ቴክኒካዊ ጥናት ውጤቶችን በህንፃ ዲዛይን ውስጥ ማካተት አለባቸው።



ሐረማያ ዩኒቨርሲቲ

የምርምር ጉዳዮች ጽ/ቤት

የፖሊሲ መግለጫ 6.2
ግንቦት 2018

የምርምር ትኩረት
መስክ

VI

የጫት አጠቃቀም የጨረር ደህንነት፡ ከግራዋ ወረዳ፣ ምሥራቅ ሀረርጌ፣ ኢትዮጵያ በአፈር እና በቅጠል ናሙና የተገኘ መረጃ

መሳይ ተጫነ¹ ፣ ገላና አመንቴ¹ ፣ እሸቱ ድሪባ¹ እና ተክለወይኒ በርሄ¹

¹የፈዝክስ ትምህርት ክፍል፣ የተፈጥሮ እና ስነ ቀመር ሳይንስ ኮሌጅ፣ ሐረማያ ዩኒቨርሲቲ፣ ኢትዮጵያ

ቁልፍ መልዕክቶች

- በግራዋ ወረዳ የሚገኘው የጫት ቅጠል ሊለካ የሚችል ተፈጥሯዊ የጨረር (Natural Radioactivity) ክምችት እንዳለው ተረጋግጧል። አማካይ የጨረር መጠኑም፡- $^{238}\text{U} = 6.54 \text{ Bq/kg}$, $^{232}\text{Th} = 12.58 \text{ Bq/kg}$ ፣ እና $^{40}\text{K} = 361.4 \text{ Bq/kg}$ ሆኖ ተመዝግቧል።
- ጫትን በመቃም ወደ ሰውነት የሚገባው ዓመታዊ የጨረር መጠን (Annual Ingestion Effective Dose) ፣ ዓለም አቀፉ የጨረር ጥበቃ ኮሚሽን (አይ.ሲ.አር.ፒ.) ለሕዝብ ካስቀመጠው ገደብ (1 mSv/ዓመት) በላይ ሆኖ ተገኝቷል። ይህም ለአንድ የጨረር ምንጭ ከተቀመጠው የሚመከር መጠን (0.3 mSv/ዓመት) ከሦስት እጥፍ በላይ ብልጫ አለው።
- አንዳንድ የጫት ናሙናዎች እስከ 3.01 mSv/ዓመት የሚደርስ የጨረር መጠን ያሳዩ ሲሆን፣ ይህም በተለይ በየቀኑ እና በከፍተኛ መጠን ጫት ለሚቅሙ ሰዎች የረጅም ጊዜ የጤና ችግር ሊያስከትል እንደሚችል ይጠቁማል።

መመገብ ውስጣዊ የጨረር ተጋላጭነትን ሊጨምር ይችላል፣ እና እንደ ካንሰር፣ የአካል ክፍሎች ጉዳት እና የዘረ-መል ልዩነት ለውጦች ያሉ የጤና አደጋዎችን ሊያመጣ ይችላል። በምስራቅ ኢትዮጵያ ጫት (ካታ ኤዱሊስ) በሰፊው የሚመረትና የሚጠቀም ስለሆነ፣ ሬዲዮኑክላይዶች ከአፈር ወደ የሚበሉ የእፅዋት ክፍሎች የሚደርሱበትን ሂደት መገምገም ለህዝብ ጤና እና ለኢኮኖሚ አስፈላጊ ጉዳይ ነው።

የምስራቅ ሀረርጌ ግራዋ ወረዳ የጫት ምርት በስፋት የሚገኝበት አካባቢ ነው። በአካባቢው ማህበረሰብ እንደ ድንገተኛ አሳት እና የሚያበረቀቅ ፍም ያሉ ያልተለመዱ ክስተቶችን መታየታቸው ተገልጿል። ይህም ስለ ማይታዩ የአካባቢ አደጋዎች ጥርጣሬ እንዲኖር አድርጓል። ጫት መጠቀም በባህላዊ ሁኔታ በስፋት የሚገኝ እና ብዙ ጊዜ በየቀኑ የሚቃም ስለሆነ፣ የሬዲዮኖች ደህንነቱን መገምገም እጅግ አስፈላጊ ነው። ይህ ጥናት በሶስት ቀበሌዎች (ቱታ ጀናታ፣ ሙዳና ጂሩ ባሊና፣ እና ጎሮ) ውስጥ የተፈጥሮ ሬዲዮአክቲቭ ደረጃን የመጀመሪያውን ስልታዊ መለኪያ ያቀርባል። ይህም የህዝብ ጤና መመሪያን፣ የግብርና ክትትልን እና የቁጥጥር እርምጃዎችን ለማሳወቅ ማስረጃ ያቀርባል።

መግቢያ

በተፈጥሮ የሚገኙ ሬዲዮአክቲቭ (ጨረራማ) ንጥረ ነገሮች እንደ ዩራኒየም (^{238}U , ^{235}U), ቶሪየም (^{232}Th) እና ፖታሲየም-40 (^{40}K) በአፈር፣ በምግብ እና በእፅዋት ውስጥ በተፈጥሮ ይገኛሉ። የእነዚህ ንጥረ ነገሮች መጠን እንደ አካባቢው ጂኦሎጂ፣ የአፈር ኬሚስትሪ እና የተክል አይነት ይለያያል። እነዚህ ሬዲዮኑክላይዶች በአጠቃላይ በዝቅተኛ መጠን ቢገኙም፣ ረጅም ጊዜ የተበከሉ እርሻ ምርቶችን

አቀራረቦች እና ውጤቶች

ከግራዋ ወረዳ በሚገኙ ሶስት ቀበሌዎች ያሉ የጫት እርሻዎች 12 የአፈር ናሙናዎች (0-30 ሴ.ሜ ጥልቀት) እና 12 የጫት ቅጠል ናሙናዎች ተሰብስበዋል።

ሁሉም ናሙናዎች በኢትዮጵያ የቴክኖሎጂ ባለስልጣን ላብራቶሪ ውስጥ ከፍተኛ ንፅህና ያለው ጀርማኒየም (HPGe) ጋማ-ሬይ ማወቂያ በመጠቀም የደረቁ፣ ተመሳሳይነት ያላቸው እና የተተነተኑ ናቸው። የ ^{238}U ፣ ^{232}Th ፣ ^{235}U እና ^{40}K የእንቅስቃሴ ክምችት ተመዝግበዋል፤ እንዲሁም ከእነዚህ የሚመነጩ የጨረር አደጋ መለኪያዎች እንደ የራዲየም ተመጣጣኝ ሁኔታ ፣ ወደ ውስጥ የተወሰደ መጠን ፣ ዓመታዊ ውጤታዊ መጠን ፣ የአደጋ መጠን መለኪያዎች (Hex, Hin) እና የህይወት ዘመን ተጨማሪ የካንሰር አደጋ (ELCR) በUNSCEAR እና በICRP መመሪያዎች መሠረት ተሰልተዋል።

ከግራዋ ወረዳ የተሰበሰቡ የአፈር ናሙናዎች ትንተና እንደሚያሳየው፣ በተፈጥሮ የሚገኙ ፊደላዊት የእንቅስቃሴ መጠን በአጠቃላይ ከዓለም አቀፍ የደህንነት ገደቦች ውስጥ እንደሚገኙ ተገኝቷል። የተመዘኑ አማካይ መጠኖች $^{238}\text{U} = 17.22 \pm 1.22 \text{ Bq/kg}$ ፣ $^{232}\text{Th} = 34.50 \pm 2.67 \text{ Bq/kg}$ ፣ $^{40}\text{K} = 275.75 \pm 4.11 \text{ Bq/kg}$ እና $^{235}\text{U} = 2.26 \pm 0.64 \text{ Bq/kg}$ ነበሩ፤ ከእነዚህ ውስጥ ^{235}U ከመደበኛ የተፈጥሮ የአፈር መጠኖች ጋር ሲነጻጸር ትንሽ ከፍ ያለ መሆኑ ተገኝቷል። ከዚህ ጋር የተያያዙ የፊደላዊት አደጋ መለኪያዎች እንደ የራዲየም ተመጣጣኝ ሁኔታ (87.79 Bq/kg)፣ ወደ ውስጥ የተወሰደ መጠን (40.71 nGy/h)፣ የውጭ ዓመታዊ ውጤታዊ መጠን (0.05 mSv/ዓመት)፣

የውስጥ ዓመታዊ ውጤታዊ መጠን (0.20 mSv/ዓመት) እና የህይወት ዘመን ተጨማሪ የካንሰር ስጋት (0.17×10^{-3}) ሁሉም ከዓለም አቀፍ አማካይ መደበኛ እሴቶች በታች እንደሆኑ ተገልጿል። ከተመሳሳይ የእርሻ ቦታዎች ላይ የተሰበሰቡ የጫት ቅጠሎች ራዲዮኑክላይዶች ከአፈር ወደ ዕፅዋት መዘዋወራቸውን የሚያሳዩ ግልጽ ምልክቶች የታዩባቸው ሲሆን፣ አማካይ የጨረር መጠኑ ንጥረ ነገር ለየራዲየም-238 (238U) $6.54 \pm 1.02 \text{ Bq/kg}$ ፣ ለቶሪየም-232 (232Th) $12.58 \pm 0.88 \text{ Bq/kg}$ ፣ እና ለፖሻሊየም-40 (40K) $361.4 \pm 25.1 \text{ Bq/kg}$ ሆኖ ተመዝግቧል። እነዚህ መጠኖች ከኬንያ እና ከየመን ጫት ጋር ሲነፃፀሩ በአጠቃላይ ዝቅተኛ ቢሆኑም፣ የየራዲየም-238 (238U) መጠን ግን ከየመን ጫት ብልጫ ያለው ሆኖ ተገኝቷል፤ ይህም በአካባቢው ለየት ያለ የንጥረ ነገሮች የመሳብ ሂደት (Site-specific uptake) መኖሩንና ትኩረት የሚሻ መሆኑን ያሳያል። በቀን ግማሽ ኪሎግራም (0.5 kg) ጫት ለሚጠቀሙ አዋቂዎች የተሰላው ዓመታዊ የጨረር መጠን ከ0.37 እስከ 3.01 mSv/ዓመት የሚደርስ ሲሆን፣ አማካይ 1.09 mSv/ዓመት ሆኖ ተመዝግቧል። ይህ አማካይ ወጤት ከዓለም አቀፍ የራዲዮሎጂ ጥበቃ ኮሚሽን (ICRP) ለሕዝብ ካስቀመጠው ገደብ (1 mSv/year) በላይ ከመሆኑም በላይ፣ ለአንድ የጥሬ ምግብ ምንጭ ከተቀመጠው የሚመከር የጨረር መጠን (0.3 mSv/year) ከሦስት እጥፍ በላይ ብልጫ አለው።

ሠንጠረዥ 1፡ የራዲዮኑክላይድ ክምችት እና የራዲዮሎጂ አደጋ ጠቋሚዎች ንፅፅር

መለኪያ	አፈር (አማካይ $\pm$ መደበኛ መዛባት)	የጫት ቅጠል (አማካይ $\pm$ መደበኛ መዛባት)	ዓለም አቀፍ ማጣቀሻ / ገደብ (Bq/kg)
^{238}U (Bq/kg)	17.22 ± 1.22	6.54 ± 1.02	~35 (የአፈር አማካይ)
^{232}Th (Bq/kg)	34.50 ± 2.67	12.58 ± 0.88	~45 (የአፈር አማካይ)
^{40}K (Bq/kg)	275.75 ± 4.11	361.4 ± 25.1	~420 (የአፈር አማካይ)
^{235}U (Bq/kg)	2.26 ± 0.64	—	ዓለም አቀፍ ማጣቀሻ የለውም
የፊደላዊም ተመጣጣኝ (R_{eq})	87.79 Bq/kg	—	89 Bq/kg
ወደ ውስጥ የተመጠነ የጨረር መጠን (nGy/h)	40.71	—	59
ከቤት ውጭ ዓመታዊ መጠን (mSv/ዓመት)	0.05	—	0.07
የቤት ውስጥ ዓመታዊ መጠን (mSv/ዓመት)	0.2	—	0.41
የመመገቢያ መጠን (mSv/ዓመት)	—	1.09 (0.37–3.01)	1 mSv/ዓመት (የICRP ገደብ); 0.3 0.3 mSv/ዓመት (የሚመከር)

አንዳንድ ናሙናዎች 3 mSv/ዓመት ከፍ ሲሉ በቀን ብዙ ጫት የሚቅሙ ሰዎች ላይ ከፍተኛ የጨረር መጠን እንደሚገኝ ይገልጻል። በዚህ ደረጃ ለረጅም ጊዜ መውሰድ የረጅም ጊዜ አደጋዎችን ከፍ ሊያደርግ ይችላል፤ ይህም የረጅም ጊዜ የጤና እክሎችን (እንደ ካንሰር) ያሉ፤ ሊያስከትል፤ የራዲዮኑክላይድ ክምችት ለጨረር ተጋላጭ በሆኑ የሰውነት ክፍሎች (እንደ አጥንት እና ኩላሊት) ላይ እንዲከማች ሊያደርግ እና ጫት በሚያዘውትሩ ሰዎች ላይ አጠቃላይ የሰውነት ውስጥ የጨረር ተጋላጭነትን ሊጨምር ይችላል። በመጨረሻም፤ ይህ ጥናት እንዲካሄድ ከመነሻ ምክንያቶቹ አንዱ በግራዋ ወረዳ ውስጥ ባሉ ማህበረሰቦች ዘንድ የሚታዩት ያልተገለጹ ድንገተኛ እሳቶች እና የሚንቀሳቀሱ ፍጦች ሪፖርቶች ናቸው። ምንም እንኳን የአፈሩ ራዲዮአክቲቪቲ መጠን ከተለመደው ገደብ ውስጥ ቢሆንም፤ ጥናቱ በሳይንሳዊ መረጃዎች ላይ በመመስረት የማህበረሰቡን ስጋት ለመቅረፍ ቀጣይነት ያለው የአካባቢ ክትትል አስፈላጊ መሆኑን ያሳያል።

የፖሊሲ ምክሮች

- የጤና ጥበቃ ሚኒስቴር፡ ደህንነቱ የተጠበቀ የጫት አጠቃቀምን በተመለከተ ለሕዝብ መመሪያ መስጠትና ከጨረር ጋር በተያያዙ የጤና ስጋቶች ላይ ግንዛቤ የመፍጠር ሥራ መሥራት ይኖርበታል።
- የኢትዮጵያ የምግብና የመድኃኒት ባለሥልጣን፡ በጫት ምርቶች ላይ መደበኛ የራዲዮኑክላይድ ምርመራ እንዲደረግ ማዘዝ እና በጫት ውስጥ ሊኖሩ ለሚችሉ የራዲዮአክቲቭ ንጥረ ነገሮች ተቀባይነት ያለው የክምችት ገደብ (Permissible limits) ማውጣት አለበት።
- የኢትዮጵያ የጨረር መከላከያ ባለሥልጣን፡ በግራዋ ወረዳ በሚገኘው አፈርና የጫት እርሻዎች ላይ ወቅታዊ ክትትል ማድረግና በጥናቱ የተገኘውን ከፍተኛ የዩራኒየም-235 (²³⁵U) መጠን በጥልቀት መመርመር ይኖርበታል።
- የግብርና ሚኒስቴር፡ የራዲዮሎጂ ምርመራን በግብርና ኤክስቴንሽን አገልግሎቱ ውስጥ ማካተትና ገበሬዎች ደህንነቱ የተጠበቀ የአመራረት ዘዴዎችን እንዲከተሉ ድጋፍ ማድረግ አለበት።
- ሐረማያ ዩኒቨርሲቲ እና የምርምር ተቋማት፡ የራዲዮኑክላይድ ንጥረ ነገሮች ከአፈር ወደ ዕፅዋት የሚዘዋወሩበትን ሁኔታ በተመለከተ የረጅም ጊዜ ጥናቶችን መቀጠልና ለአካባቢው የአካባቢ ክትትል ጥረቶች ቴክኒካዊ ድጋፍ መስጠት ይኖርባቸዋል።



IBSA IMAAMMATAA

2018

**Afaan oromootti kan hiike
Dani'eel Bal'is (PhD)**



YUUNIVARSIITII HARAMAAYAA

BIIROO DHIMMA QORANNOO

IBSA IMAAMMATAA 1.1

Caamsaa 2018

GOOROO
QORANNOO

I

**Dhiibbaa Jijjiiramni Qilleensaa Bishingaa irratti Qabu:
Dandamannaa Egereef Raaga Moodela irratti Hundaa'eefi
Tarsiimoo Madaqinsaa**

Darajee Rattaa¹, Girmaa Asaffaa¹, Mangistuu Mangashaa¹, fi Alamnash Baqqalaa¹

¹Koolleejjii Qonnaa fi Saayinsii Naannoo, Yuunivarsiitii Haramaayaa, Haramaayaa, Lakk. Poostaa 138
Dirree Dhawaa, Itoophiyaa

Ergaawwan Ijoo

- Giddu galeessaan aanaalee Baabbileefi Fadisitti waggaatti roobni %35 fi %58n akka hir'atuufi kunis bara 2080tti 4.1°C dabalun hordofamee akka ta'e raagni mul'isa. Mudannoon kun bu'aa bishingaa irraa argamu qabatamaan daran gad buusa.
- Daangaa teroo itti faca'uu qabuun ala baasuun bu'aa guddaa dhabuuf ssaxila, dursanii (Wax. 15 dura) yoo facaasan bu'aan %5-7 akka gad bu'uufi harkifachuun (Adool. 10 booda) ammoo %21n hir'isa.
- Gosti sanyii Erer-1 dandamannaa haala qilleensaan olaanaa ta'ee, yeroo sirrii keessatti yoo faca'e aanaa Baabbileetti bu'aa %12 fi aanaa Fadisitti ammoo %6n dabale.
- Ho'insi yeroo guddina bishingaa gad baabsuu, guyyaa daraaraafi bilchinaa 11-37n hir'isuun, rifaatuun ho'insaf qabu dabaluufti kuufama biomass daangessa.
- Raawwilee qilleensa mijatoo kanneen akka yeroo sirriitti facaasuu, xaa'oo haalaan wal simatu tajaajilamuufi gosoota amala dandamannaa qaban tajaajilamuun oomisha hir'isa jedhamee kan raagame irraa hanga tokko akka hanqatu taasisa, innis gosti sanyii Melkam %11.7 fi Erer-01 ammoo %12.2 akka dabalana gochuuni.

Seensa

Moodeloonni mala midhaan facaasuu tarsiimoo madaallii itti fufinsa oomishaafi dhiibbaa

jijjiiramni haala qilleensaa bu'aa oomishaa irratti qabu sakatta'uuf qooda olaanaa tapahatu. Gosoota midhaan qonnaafi bakkeewwan gara garaaf moodeloonni midhaanii adeemsa eco-physiology, haala naannoofi filannoowwan to'annoo biqiltuu walitti madaqsa. Gahumsa qabatamoo haalawwan gara garaa addunyaa calaqqisan qabachuun, dhiibbaa haala qilleensaa xiinxaluufi tarsiimowwan madaqinsaa madaaluuf Decision Support Systems for Agrotechnology Transfer (DSSAT) ulaagaa mirkanaa'aadha.

Itiyoophiyaa keessatti xaafiifi boqqollootti aansuun bishingaan qonnaan bultoota sadarkaa gadiirra jiraniif gosa midhaanii murteessaadha. Humna goginsa dandamannaa isaa akka jirutti ta'ee, ammayyu oomishni bishingaa akka gadbu'u kan taasisan jijjiirama qilleensaa, mala qonnaa gadi bu'oofi dhiibbaaleen hawaas-dinagdee naannowwan gammoojjii baha Itiyoophiyaa keessatti dhiibbaa hamaa ta'ee itti fee jira.

Godina Baha Harargee, aanaaleen akka Baabbileefi Fadis hongee irra deddeebiin mudatu, addaan ciccitinsa roobaa, manca'insa dacheefi dhiibbaalee haala qilleensaan wal qabatanii mudataniin oomishni midhaanii akka gadbu'uufi rakkoon abbootii warraa/maatii akka dabaluu taasisa. Sababa qonnaan bultoonni sadarkaa gadii rooba irratti hundaa'uun oomishaniifi haala

to'annaa barsiifataa hordofaniif, oomishni bishingaa amaala roobni qabu, ho'insi dabaluufi rakkoo jiidhinsi biyyee mudatuuf daran saaxilama. Dhiibbaa haalli qilleensaa naannowwaniifi gosoota midhaanii gara garaa irratti fidu qabachuun, oomishni bishingaa raaga haala qilleensaa jiruun hangam akka hubamu bakka gara garaatti gadibuusaniif sakatta'uun hanga isaa kaa'uun hojii hatattamaan barbaachisudha. Qorannoo kanaanis raagni jijjiirama haala qilleensaa jiru dhiibbaanni oomisha bishingaa irratti qabu sakatta'uufi tarsimoo mala qonnaa madaqsuu irratti jiru adda baasuun hawaasni baha Itiyoophiyaa dandamannaa jijjiiramaa qilleensaa isaa cimsuuf karoorfame.

Malaafi Argannoo

Egereen jijjiirma haala qilleensaa oomisha bishingaa aanaalee Baabbileefi Fadis irratti fidan madaaluuf moodela midhaanii DSSAT-ti qorannoo kanaaf hojiirra oole. Ragaaleen seenaa haala qilleensaa, biyyee fi midhanii, akkasumas raagni haala qilleensaa moodela CORDEX-Africa irraa madaqfameera. Amala haala qilleensaa RCP4.5 fi RCP8.5 jalatti amala oomishaa sakattaa'uuf yaalii hojii dirreefi fakkeessummaa (field experiments, and simulations) taasifameen gosoonni bishingaa afur adda baafamuun mirkanaa'aniiru. Qorannoo kanaan raaga amala haala qilleensaa irratti jiru keessatti taarsiimowwan haala bishingaani itti dandamachuu danda'u adda baasuuf, mala madaqinsaa gara garaa kanneen akka guyyaa itti

faca'u, haala itti fayyadama xaa'oofi yabbinaafi haphina ittiin faca'uun madaalliin taasifame. Qorannoon kun ragaa haala qilleensaa bara 1990-2021 fi raaga saddet GCM RCP4.5 fi RCP8.5 jalaa fudhchuun bara 2050 fi 2080 fakkeessuun ga'umsi oomishni bishingaa aanaalee Baabbileefi Fadis qabaatan xiinxale. Moodelli Bishingaa-CERES, bu'aawwan garaa garummaa midhaaniifi bakkaa fakkeessummaa fi daawwannaan argaman hunda gidduu wal simannaan jabaa jiraachuu mul'isuun, guddina midhaaniifi oomishaa sirriitti bakka bu'e.

Raagni haala qilleensaa aanaalee lamaaniif akeekkachiisa jabaa agarsiisa. Haalonni RCP8.5 jalaa kan baroota 2080nii, ho'insi olaanaa (Tmax) 4.1oCtti akka ol guddatu, gadi aanaan (Tmin) ammoo 2.7°C irraa gara 4.6°C-tti akka guddatuti eegama.

Faallaa kanaan, raaga rooba waggaan wal qabatee haala walmakaati calaqqisa. Aanaalee lamaanuu hir'inni yoo mudatu, hammenyummaan isaa wal caala: Baabbileen RCP4.5 jalatti bara 2080n %35.24n akka gadi bu'u yoo raagamu, Fadis ammoo haalaafi yeroo wal fakkaataan %58.2n gadibu'a (Gabatee 1). Jijjiiramni kuneen, akka guutummaa Itiyoophiyaatti gadi bu'insa hanga rooba argamuu qorannoon eeru faana waldeeggaru.

Gabatee 1: Ibsa ammamtaa jijjiirama roobaafi ho'aa waggaa keessatti.

Aanaa Baabbilee							
Haalota	Yeroo	Rooba waggaa (mm)	ΔRooba %n	Tmax (C)	Tmin (C)	ΔTmax (C)	ΔTmin (C)
Daangaa	1990-2021	754.02		29.1	17.4		
RCP4.5	2050s	554.4	-26.47	30.9	17.4	1.8	0.0
RCP4.5	2080s	488.3	-35.24	31.4	18.0	2.3	0.6
RCP8.5	2050s	760.0	0.79	31.6	18.0	2.5	0.6
RCP8.5	2080s	697.7	-7.46	33.2	20.1	4.1	2.7
Aanaa Fadis							
Daangaa		908.7		27.6	14.6		
RCP4.5	2050s	769.3	-15.3	29.4	16.5	1.8	1.9
RCP4.5	2080s	380.0	-58.2	29.9	17.1	2.3	2.5
RCP8.5	2050s	588.3	-35.3	30.0	17.2	2.4	2.6
RCP8.5	2080s	896.2	-1.4	31.7	19.2	4.1	4.6

Argannoon faakkeessa guddina midhaanii akka mul'isutti haalota hedduu keessatti marsaan jireenya bishingaa gabaabbachuu, kunis kan calaqqisu guyyoota daraaraafi guddina/jabina midhaanii hir'isuuni. Haata'uutii, amaloonni addaa mul'ataniiru: kan bara 2050nii RCP4.5 jalatti turtiin daraaraa gosa Melkam dhaabbataa ta'ee, kan Fedis-01 fi Erer-01 bara 2050nii fi 2080nii RCP8.5 jalatti jijjiirama hinmul'isne (Gabatee 2).

Amaloonni addaa kunneen aanaa Baabbileetti ho'insa dandamachuun garaa garummaa sanyiin akka mul'atu yaada kenna. Faallaa kanaan, aanaa Fadisitti garaa garummaa haala qilleensaa irratti hundaa'uun sadarkaan guddinaa hariifachuu ykn harkifachuu akka danda'uti raagame.

Gabatee 2: Raaga jijjiirama oomisha (%) gosootaa yeroo faca'insa gara garaa kan baroota 2050nii fi 2080nii (RCP 4.5 and 8.5) kan aanaa Baabbilee.

Gosoota	Oomisha (kg/ha)	Bu'uraa	Yeroo facaatii	RCP4.5		RCP8.5	
				2050n	2080n	2050n	2080n
Melkam	2500		15-Waxabajji	-5.3	-2.4	-6.9	-2.8
			25-Waxabajji	11.7	8.7	2.1	1.8
			10-Adoolessa	-4.1	-5.6	-4.3	-1.2
Teshale	2556		15-Waxabajji	-4.1	-1.5	-1.8	-2.6
			25-Waxabajji	9.7	-1.6	4.3	-5.4
			10-Adoolessa	2.4	3.7	7.2	4.9
Erer-01	2278		15-Waxabajji	-4.3	-6.4	-7.1	-3.7
			25-Waxabajji	12.2	4.7	12.1	2.7
			10-Adoolessa	-21.1	-13.6	3.3	-1.2
Fedis-01	2166		15-Waxabajji	5.3	-5.5	4.5	2.6
			25-Waxabajji	-7.3	-6.6	4.1	-3.7
			10-Adoolessa	3.1	4.7	7.2	3.3

Raagni haala qilleensaa jiru akka mul'isutti, keessattuu Wax.15 dura kan facaafamuun aanaa lamaan keessatti oomishni bishingaa akka gadi bu'udha. Yeroo isaa malee dursanii facaasuun itti fufinsaan oomishni kan gadi bu'u gosoota, haalotaafi daangaa yeroo hunda keessatti ta'ee, kunis hir'ina oomishaa sababa ho'insi dabaluu fi rakkoo jiidhisa biyyee guddina midhaanii irratti mudatu jiru mirkaneessa. Haala wal fakkaatuun, aanaalee lameen irraa ragaa argameen harkifatanii (Adool. 10 booda) facaasuun, utuu midhaan haalaan hinnaqattiin roobni waan irraa cituuf, oomisha dhabsiisa (Gabatee 2 fi 3). Argannoon kun, qorannoo

Argannoon faakkeessa guddina midhaanii akka mul'isutti haalota hedduu keessatti marsaan jireenya bishingaa gabaabbachuu, kunis kan calaqqisu guyyoota daraaraafi guddina/jabina midhaanii hir'isuuni. Haata'uutii, amaloonni addaa mul'ataniiru: kan bara 2050nii RCP4.5 jalatti turtiin daraaraa gosa Melkam dhaabbataa ta'ee, kan Fedis-01 fi Erer-01 bara 2050nii fi 2080nii RCP8.5 jalatti jijjiirama hinmul'isne (Gabatee 2). Amaloonni addaa kunneen aanaa Baabbileetti ho'insa dandamachuun garaa garummaa sanyiin akka mul'atu yaada kenna. Faallaa kanaan, aanaa Fadisitti garaa garummaa haala qilleensaa irratti hundaa'uun sadarkaan guddinaa hariifachuu ykn harkifachuu akka danda'uti raagame.

Baha Afrikaatti dursa hojjetamee goginsa dursee mudatuufi hanqina jiidhinsa biyyee oomisha bishingaa gadbuusuun sababa angafa ta'uu ibsameen wal tumsa. Yeroon facaafannaa sirriin aanolee gidduu addummaan xiqqoo jira garuu akka walii galaatti Waxb. 25 giddu galeefftu, Baabbileetti Melkam, Teshale, fi Erer-01 akkasumas Fadisitti gosoota faca'an hundaan oomishni fooyya'eera. RCP4.5 jalatti fooyya'insi olaanaa bara 2050nii Melkam +%11.7 fi Erer-01 +%12.2 ga'e. RCP8.5 jalatti bu'aan jiru xiqqaatus haalonni jiran garuu qixa sirriin fudhatamu (Gabatee 2 fi 3).

Gabatee 3: Raaga jijjiirama oomisha (%) gosootaa yeroo faca'insa gara garaa kan baroota 2050nii fi 2080nii (RCP 4.5 and 8.5) kan aanaa Fadiis.

Gosoota	Oomisha Bu'uraa (kg/ha)	Yeroo facaatii	RCP4.5		RCP8.5	
			2050n	2080n	2050n	2080n
Melkam	3277	15-Waxabajji	-3.7	-4.4	-1.1	-3.2
		25-Waxabajji	3.3	-6.3	-13.1	4.2
		10-Adoolessa	-16.1	-9.6	-21.3	-4.8
Teshale	2777	15-Waxabajji	-5.1	-3.5	-8.8	-8.6
		25-Waxabajji	4.7	3.6	3.3	1.7
		10-Adoolessa	7.2	-8.7	4.2	-4.9
Erer-01	2722	15-Waxabajji	-9.7	-5.5	-0.4	-2.1
		25-Waxabajji	5.3	6.1	-6.3	4.3
		10-Adoolessa	-13.3	-17.5	-14.1	5.3
Fedis-01	3500	15-Waxabajji	-2.1	-3.5	-3.8	-8.6
		25-Waxabajji	1.4	1.6	2.3	1.2
		10-Adoolessa	6.1	-13.7	5.2	1.9

Walumaagalatti, haala bu'aan moodelaa agarsiisuun jijjiiramni qilleensaa ho'i akka dabaluufi hanqinni bishaanii Baabbileefi Fadisitti mudatu hojiin madaqinsaa raawwatu malee oomisha bishingaa gadi buusa. Tarsiimoo qindaa'aa akka gara dhuma Waxabajjiitti facasuu, amla dandamannaa kan qaban kan akka Erer-01 filachuufi, hordoffii sirrii taasisuun, manca'insa haala qilleensaan mudatu hir'isuufi dandamannoo oomisha bishingaa dabala. Malleen hordoffii haala qilleensa gaariin qajeelfama guyyaa faca'insa sirrii hordofuufi gosa midhaan qotanii sirrii ta'e filachuun egeree oomishaa eeguuf baha Itiyoophiyaaf isa murteessaadha.

Yaada Imaammataa

- Ministeerri qonnaafi biirooleen naannoo sadarkaa aanaatti qindeessuun gosoota bishingaa jijjiirama qilleensaa dandamatan irratti sagantaalee

madaqinsaafi raawwilee muuxannoo qonnaa wal fakkaataa qabanitti geessuu qabu

- Dhaabbileen qorannoo qonnaafi interpiraayizoonni sanyii gosa Erer-01, amala dandamannaa agarsiisaniifi ga'umsa isaan jijjiirama qilleensaa fuulduratti dhufu keessatti qaban irraa ka'uun, irratti xiyyeeffachuun Baabbileefi Fadis akkasumas bakkeewwan aanaalee kanaaf haala qilleensa wal fakkaataa qabaniif walitti fufinsaan oomishamee akka dhihaatu gochuu qabu.
- Ministeerri qonnaa, adeemsa murtoo kenninsaa keessatti meeshaalee moodeela midhaanii sadarkaa olaanaa qabaniin walitti fiduu, qaamni imaammata baasu dhiibbaa haala qilleensaa, jijjiiranii facaasuufi hariiroo fayyaa biyyee ga'umsaan madaaluun karoora haala qilleensaa ragaa irratti hundaa'e jajjabeessuu qaba.
- Inistitiyuutiin haala qilleensaa Itiyoophiyaafi ekisteenshinoonni qonnaan bultootaaf gosa midhaanii irratti xiyyeeffannoo kennuu kaban irratti leenjisuufi raaga haala qilleensaa jiru keessatti oomisha isaanii haala itti guddisuu danda'an irratti gorsa jabaa kennuu qabu.



YUUNIVARSIITII HARAMAAYAA

BIIROO DHIMMA QORANNOO

IBSA IMAAMMATAA 1.2

Caamsaa 2018

GOOROO
QORANNOO

I

Karoorri Fayyaa Jabbilee Ragaa irratti Hundaa'e Fayyaafi Ga'umsa Aannaniifi Jabbilee Gaalaa Fooyyessa

Yihenawu Geetaahuun¹, Ambaachawu Motbayinoor¹, Shiihuun Shiimaliis¹, fi Miinaa Alii¹

¹Kolleejjii Fayyaa Beeyladaa, Yuunivarsiitii Haramaayaa, Lakk. Poostaa 138 Dirree Dhawaa, Itoophiyaa

Ergaawwan Ijoo

- Karoorri fayyaa jabbilee guyyuu kan to'annaa gadi bu'aan taasifamuun yoo wal bira qabamu, dhibee %29.5 fi du'aatii %10.4n hir'isa.
- Jabbiin dhalatee hanga sa'a ja'aatti silla/silga kennuufiin carraa lubbuun turuu dabala, dhibees immoo dhukkuba %52 fi du'aatii %66n hir'isa.
- Jabbileen umriin isaanii ≤ 3 ta'an dhukkubaafi dhibeef daran waan saaxilamaniif, kunuunsi cimaa durfamee taasifamuufii qaba.
- Muuxannoo kunuunsi ga'aa hintaasifamne keessatti, sadarkaan dhibeef saaxilamuu jabbilee kormaa kanneen goromsaarra dachaan caala.
- Karoorri fayyaa guddina ga'umsa qabu fooyyesse: guyyaatti ulfaatinni jabbii %4.4 fi hanga soora aannan cinatti dhihaatuu %4.5n dabale.

Seensa

Itiyoophiyaan fedhi aannaniifi oomisha aannanii akka biyyaatti daran dabalaa dhufe galma ga'uuf daldalaafi qonnaan bultoota, mala oomisha aannanii gabaan barbaadu irratti hojjetan babal'isuuf dursa kennite. Naannoo gammoojjitti horsiisa qofaas te'e horsiisaafi qonna wal keessa hojjetanii jiraataniif gaalli keessattuu bakkeewwan rooba gadaanaa argataniif madda aannaniifi galii olaanaa argamsiisa. Haata'umalee, dhibeefi du'aatiin jabbilee baay'achuun kaka'umsa akka hawaasaatti horsiisa horiitiin ga'umsa jiru irratti gufuu guddaa ta'aniiru.

Akka ragaaleen mul'isanitti Itiyoophiyaatti sadarkaa dhibeefi du'aatii jabbilee %47.3 fi 17.9 ga'e (Alemu et al., 2022), jabbilee gaalaan wal qabatee dhibeen %35 fi du'aatiin %9tti tilmaamama (Fentie et al., 2016). Rakkoowwan akkanaa horii bakka buusuu, horsiisuufi oomisha aannaniifi hidhata bu'aawwan gala irraa argaman yeroo dheeraaf itti fufsiisuuf yaaddoo guddaadha.

Du'aatiin jabbilee, baasiin yaalaa, ga'umsi guddinaa gadi bu'uufi umrii isaanii keessatti hanga aannan kenna hir'achuun dhiibbaanni dinagdee irratti qabu olaanaadha. Akka qorannooleen mul'isanitti, muuxannoo kunuunsa jabbilee fooyyessuu keessaa kan akka soorata dabalaa yeroon nyaachisuu, bakka galmaa fooyya'aa, qulqullinaafi ejjennoon ittisa dhukkubaa rakkoo dhukkuba jabbilee hir'isuufi hanga bu'aalee dabaluu irratti jijjiirama qabatamaa fidu. Sadarkaa biyyaatti xiyyeeffannoo horssiisa horiifi guddina oomisha aannanii irratti kenneameen wal qabatee dhibeefi du'aatii jabbilee hir'isuun murteessaadha.

Fooyya'insi fayyaa jabbiifi ga'umsaa fiduun kan danda'amu gama qulqullina aannaniifi muuxannoo fayyaafi to'annoo jabbilee gaalaa babal'isuufi hojiirra oolchuuni. Galma Itiyoophiyaan oomisha aannaniifi horsiisa gaalaa irratti qabdu galmaan ga'uuf, karoora hojiitti hiikamuufi fayyaa jabbilee ragaa irratti hundaa'e hordofuun dhiibbaa guddaa geessisu.

Malaafi Argannoo

Dhiibbaa karoora fayyaa jabbilee guyyuu raga irratti hundaa'ee, du'aatiifi guddina isaanii sakatta'uuf, oomisha aannanii Dirre Dawaafi Harar keessatti yaaliin to'annoo tasaa bara 2023 Gurraandhalaa hanga Onkoloolessaatti gaggeeffameera. Loon rimaa dhibba tokkoofi soddonii toorba (137) kan fudhataman ta'ee, isaanis rimaa ji'a ≥ 8 fi eeyyamni irratti argatamedha. Jabbilee reefuu dhalatan keessaa mala iddatteessuu tasaan garee yaalii (fayyaa jabbilee qindaa'aa guyyaan taasifamu) fi garee yaaliin addaa hintaasfamne (adeemsa baramaa isaanii) jechuun lamatti qoodamani. Jabbileen baatii ja'aaf, torbanitti yeroo tokko hordoffiin taasifame. Tajaajilli fayyaa, ulfaatina ilmoofi soora kennamuufi giddu galeessaan guyyaatti hanga isaan dabalani (ADWG, via rondo-tape), dhiibbaa adeemsa horsiisa isaanii wal qabatee mudatu (yeroo silgaa, mana itti galchan, garaa garummaa umrii, qulqullinaafi qulqullina meeshaalee) akka jirutti ta'eeti kan galmeeffame. Carraan mudannaa dhibee kanneen yaalli irratti taasifamuu %24 fi kan yaala hinqabne ammoo %40 ta'ee, carraan du'aatii %13 fi %24 garaa garummaan gidduu jiru olaanaa ta'ee kan mul'atu.

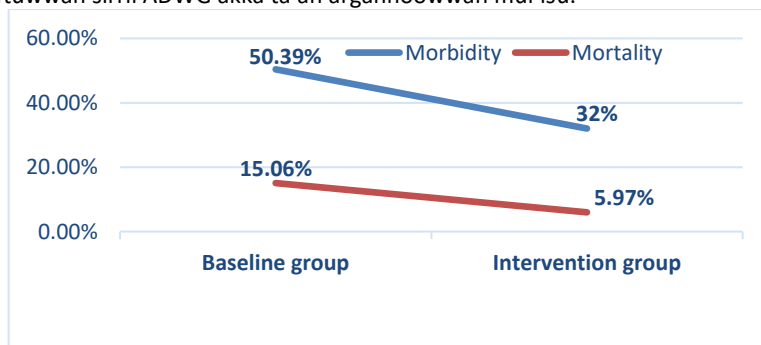
Hordoffii kennameen wal qabatee sadarkaan dhibeen qabamuufi du'aatii kan hir'ate yoo ta'u, dhibeen qabamuun kan garee yaala qabanii %29.53, kan hinqabnee %49.34 fi du'aatiin %10.42 fi %19.75 mul'ate.

Agarsiiftuun sirrii carraa dhibeen qabamuufi du'aatii kan ta'an garee kunuunsi taasifamuuf, saala, umriifi yeroo silgaati. Jabbileen yaala hin'arganne carraa du'uu isaanii naannoo dacha sadiiti (HR = 2.78); silla dafanii kennuun balaa du'aatii sadii keessaa harka lamaan hir'isa (HR = 0.34) fi jabbileen umriin isaanii baatii sadiifi sadii gadii dacha sadii oliin (HR = 3.61) du'aatiif saaxilamu. Jabbiin kormaa dachaa lamaan (HR = 2.03) dhukkubaaf saaxilamoodha, dhalatanii sa'atii ja'a gidduutti dafanii silga kennuufiin carraa dhukkubsachuu naannoo walakkaan (HR = 0.48) hir'isa. Akkaataa karooraan sadarkaan guddinaa dabaluu giddu galeessaan guyyaatti ulfaatina gareen yaalaa dabalani 0.776 ± 0.095 kg fi kan yaala hinqabnee 0.743 ± 0.069 kg ta'uun ($p=0.042$), akkasumas hanga soora dabalataa kennamuu 154.37 kg vs 147.73 kg ($p<0.001$) ture (Gabatee 1).

Gabatee 1: Ulfaatina yeroo dhalatanii (UYDh), hanga soora dabalataa (HSD) fi ulfaatina guyyaatti jabbileen dabalani (UGJD).

Ulfaatina (Kg)	Garee to'annoo (mean $\pm$ SD)	Garee yaalii (mean $\pm$ SD)	t-test	p-value
UYDh	34.616 $\pm$ 4.241	34.966 $\pm$ 4.700	-0.457	0.648
HSD	147.727 $\pm$ 4.361	154.373 $\pm$ 6.579	-6.172	<0.001*
UGJD	0.743 $\pm$ 0.069	0.776 $\pm$ 0.095	-2.056	0.042*

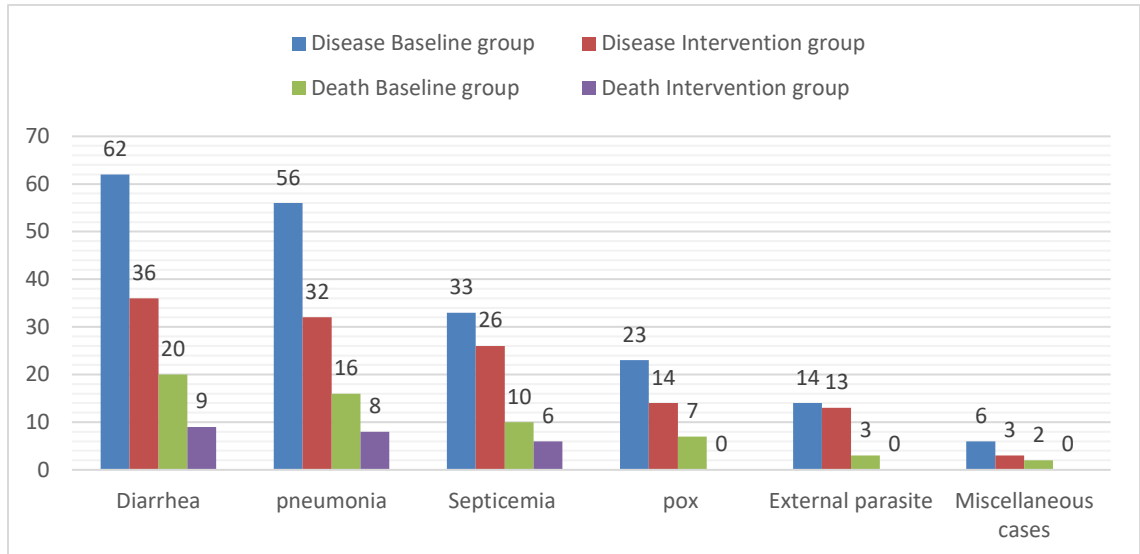
Akkaataa karooraan sadarkaan guddinaa dabaluu giddu galeessaan guyyaatti ulfaatina gareen yaalaa dabalani 0.776 ± 0.095 kg fi kan yaala hinqabnee 0.743 ± 0.069 kg ta'uun ($p=0.042$), akkasumas hanga soora dabalataa kennamuu 154.37 kg vs 147.73 kg ($p<0.001$) ture (Gabatee 1). Yaliiwwan biroofi aannan guyyaatti liitira ≥ 3 argachuun agarsiiftuwwan sirrii ADWG akka ta'an argannoowwan mul'isu.



Fakii 1: Sadarkaa dhibamuufi du'aatii garee jabbilee to'annoo/yaala hinqabnee (baseline) fi yaala qabanii (intervention).

Dhibamuun jabbilee gaalaa %50.39 to’annoo jalaa/yaala hinargatiin, kan garee yaala argatan gara %32.21tti gadi bu’e. sadarkaan du’aatiis garee to’annoo keessaa jiranii %15.06 gara %5.97 kan yaala argataniitti gadi bu’e (Fakii 1).

Garee lamaaniiifuu garaa kaasaafi daranyoo sombaa dhukkuboota daran beekamoo ta’anis, kanneen yaala qaban keessatti lamaanuu gadaanaadha (Fakii 2).



Fakii 2: Sadarkaa dhibamuufi du’aatii jabbilee garee lamaanii.

Hangi soora dabalataa ($105.22 \pm 3.1\text{kg}$) kan garee yaala qabanii kan garee to’annoo jalaan (96.43 ± 2.4) yoo wal madaalchifamu daran caala (Gabatee 2).

Gabatee 2: Ulfaatina yeroo dhalannaa, soora dabalataafi ulfaatina guyyaatti jabbileen dabalani.

Ulfaatina (Kg)	Garee to’annoo (mean $\pm$ SD)	Garee yaalii (mean $\pm$ SD)	t-test	P value
UYDh	34.31 $\pm$ 0.94	34.26 $\pm$ 0.92	0.54	0.613
HSD	96.43 $\pm$ 2.4	105.22 $\pm$ 3.1	-98.25	<0.001
UGJD	0.23 $\pm$ 0.01	0.26 $\pm$ 0.02	-0.37	0.714

Karoora fayyaa jabbilee ragaa irratti hundaa’e hordofuun rakkoo soorata idilee bira utuu hinga’iin mudatu dandamachuufi guddina isaanii irratti fooyya’insa guddaa akka qabu qorannoon kun mul’isa. Carraan dhibeen qabamuufi du’aatii akka hir’atuuf qooda kan ba’an, silga dafanii kennuu, qulqullinaafi adeemsa qindaa’aa guddisa jabbilee jiraachuudha. Hanqina dhibee ittisuu qaban irraa kan ka’e, dhiibbaan xiqqummaatti isaan mudatu yeroo dheeraaf akka saaxilaman isaan taasisa. Guddinni

ADWG olaanaafi soorata dabalataa hedduun argamu kan mul’isu to’annoo jireenya xiqqummaa fooyya’aa oomishtummaa dabaluuutti hiikamu akka qabudha. Argannoowwan kun hundi, karoorri fayyaa jabbilee lubbuu baraaruu qofa utuu hintaane oomishtoota aannaniif bu’aa dinagdees olaanaa fida. Walitti qabaan, karoorri fayyaa jabbilee qindaa’aan dandamannaa, dhibee hir’isuufi guddina fooyyessuun mala oomisha aannanii Itiyoophiyaa cimsuuf kallattii qabatamaa agarsiisa.

Yaada Imaammataa

- Ministeerri qonnaafi biirowwan qonnaa sadarkaa naannoo du'aatii jabbilee to'atamuu danda'an dhabamsiisuuf karoora guyyaa fayyaa jabbilee madaqsuu jajjabeessuu qabu.
- Qaamoleen dhimmi ilaalaatu jabbiin dhalatee sa'aatii ja'a gidduutti silga obaasuu akka qaban kakaasuufi leenjii kennuu.
- Ogeeyyiin fayyaa beeyladaafi horsiisa irratti

hojjetan qonnaan bultoota/horsiisee bultootafi qaamolee hordofaniif akkamitti jabbii dhalatte akka kunuunsan, qulqullinaafi jabbilee kormaafi dhalaaf kunuunsa qixa akka taasisan irratti leenjisu qabu.

- Bulchiinsi sadarkaa gadiifi hojjettoonni misoomaa bakka qulqulluu jabbileen itti galan, bakka ciisichaa mijataafi baasii gadaanaan meeshaa qulqulluu itti sooran, mala itti tajaajilaman akka qabaatan irratti leenjisu qabu.



YUUNIVARSIITII HARAMAAYAA

BIIROO DHIMMA QORANNOO

IBSA IMAAMMATAA 1.3

Caamsaa 2018

GOOROO
QORANNOO

I

Horsiisa Booyyee keessatti Balaa Dhibee Zoonotic-f Saaxilamuu: Hubannoo 'Qorannoo Taatee' Qonna Baha Itiyoophiyaa irraa

Adam Hiikkoo¹, Fayyisaa Aliyyi¹, Abdallaahii Abdurraahiman¹, fi Sisaay Girmaa¹

¹Kolleejjii Fayyaa Beeyladaa, Yuunivarsiitii Haramaayaa, Lakk. Poostaa 138 Dirree Dhawaa, Itoophiyaa

Ergaawwan Ijoo

- Ooyruu horsiisa booyyee qorannoof filataman keessatti dhibeewwan horii irraa namatti darban keessaa *Salmonella* %27.55 fi *E. coli* %57.14ti argamani.
- Allaattiwwan balaa tatamsa'inaaf qooda kan ba'an yoo ta'u, bobbaa isaaniirraa saamuda fudhatameen *Salmonella* %40 fi *E. coli* %70 baatu.
- Sababoota tuttuqqaa gara garaa irraa kan ka'e, carraa dhibeen lamaan waliin mudachuu %21.43 akka ta'e saamudaan mul'ate.
- Hubannoo namootni horsiisa keessa hojjetan zoonotic irratti qabangadi bu'aa, %40 gadiin dhibee keessaa balaa horiirraa namatti darbuuti calaqqise.

Seensa

Waggoota kurnan muraasa darban keessatti akka addunyaatti oomishni foon booyyee dabalun wal qabatee biyyoota addunyaa gara garaa keessatti horsiisni booyyees akka baayyatu taasise. Adeemsi kun dhaabbileen xiqqoo garuu umna oomishuu guddaa kan qaban akka uumamaniifi tokkoon tokkoo isaanii horii hedduu keessummeessu. Baay'inni horsiisaa dabaluu fi raawwiin to'annoo qormaatatti seene hordofee industiroonni booyyee dhibeewwan daddarboo adda baasuu keessatti ga'een isaanii dabalaa dhufe. Fournié et al. (2015), vaayireesota 39 fi gosoota baakteeriyaa 32 dabalatee waantota dhibee fidan 77 kaneen amma dura bara 1985

booyyeen wal qabatee hingabaafamne galmeessise, %20 biyyoota foon booyyee oomishan %82 dhibee kanaaf sababa ta'u. waantota dhibee fidan haaraya adda baafaman keessaa 30 (%39) kan horii/bineensa irraa namatti daddarbanidha. Jijjiiramni kunneen biyyoota booyyee horsiisaa garuu mala ofeeggannoo ga'aa hinqabne dhibeewwan daddarboo booyyeen wal qabatan uumamniifi tamsa'inni isaanii dabalaa deemuuf sababa akka ta'uu malan yaada keenna.

Dhibeewwa zoonotic booyyeen wal qabatan hedduun kan daddarban tuttuqqaa bobbaa-afaaniini. Amala isstirraa *E. coli* bineensota kan hinhubne ta'us, adeemsa horsiisa booyyee keessatti dhibeewwan keessoo to'achuuf orgaanizimii agsrsiiftuudha. Salmonellosis foon booyyeen wal qabatu gama isaan yaaddoo fayyaa hawaasaaf isa murteessaadha. Salmonellosis nama keessatti argaman keessaa tilmaamaan %1 hanga %25 kan ta'u foon booyyeefi bu'aawwan isaa irraa maddu. Haata'utii, ragaan akkanaa Itiyoophiyaatti qofa kan daanga'anidha. Horsiisa booyyeefi qaawwa ofeeggannoo dhibee nageenyaa dabalaa dhufeen wal qabatee dhiibbaafi tatamsa'ina dhibeewwan keessaa horsiisa booyyeen dhufan irratti hubannoo qabaachuun balaa zoonotic hir'isa. Kanaafuu, qorannoon kun madda dhibeewwan qaama keessaa kan akka *Salmonella* fi *E. coli* adda baasuufi Horsiisa Booyyee Yuunivarsiitii Haramaayaa keessatti muuxannoo to'annoo horsiisa booyyee irratti jiru sakatta'uudha.

Malaafi Argannoo

Qorannoon kun mala iddattoo dhimmataa (purposive) tajaajilamuun Horsiisa Booyyee Yuunivarsiitii Haramayaa irratti gaggeeffame. Saamudni bobbaa booyyee 146 hunda irraa fudhatame. Dabalataan, saamudni soorata, bishaan dhugaatii, tuttuqqaa mana booyyee, meeshaalee hojjettootaa, meeshaalee qulqullinaafi bobbaa allaattii naannoo horsiisa booyyee kana marsanii mala tooftaan (systematically) fudhatameera. Hojjettoonni bakkichaa muuxannoo to'annoo, amala qulqullinaafi dammaqinsa *Salmonella* fi *E. coli* balaa dhibee booyyee irraa namatti darban sakatta'uuf 25 hundi hirmaataniiru. Saamudonni haala qabbaneessituu keessaan gara Veterinary Microbiology fi Public Health Laboratory-tti geeffamuun *Salmonella* -f ISO 6579 (2017) fi *E. coli*-f (ISO, 2017; Hirsh, 2003) hordofuun qorannoon taasifame. Bargaaffiin Afaan Oromoofi/ykn Amaariffaan gaggeeffameera. Ragaaleen laaboraatooriifi sakattaan argaman mala STATA 14, garaa garummaa mudannoo sababoot balaa ($p < 0.05$) Pearson's chi-square, akkasumas kanneen dhibee fidan lamaan gidduu ($p < 0.01$) madaaluu waliin xiinxalli gaggeeffame.

Saamuda fudhatame hunda keessatti carraan mudannoo *Salmonella* fi *E. coli* tokkoon tokkoo isaanii %27.55 fi %57.14 dha. Saamuda bobbaa booyyee irraa fudhatameen keessatti *Salmonella* %25.34 fi *E. coli* %50 yoo argamu, dhibeewwaan lamaaniif booyyeen baattuu sirrii ta'uu agarsiisa (Gabatee 1). Mudannoon *Salmonella* saamuda gidduutti garaa garummaa guddaa hinqabu ($p = 0.63$) yoo ta'u, *E. coli* ammoo ($p = 0.03$) dha. Dhibeewwan lamaan yoo wal madaalchifaman, *E. coli* saamuda hunda keessatti amala naannootti cichee turuufi ooyiruu bal'inaan ooyruu waliin ga'uu isaan *Salmonella* caalaa bal'inaan tamsa'uu agarsiisu.

Salmonella-n saamuda naannoo fudhatame hafa mana booyyee keessaa, dacheerraa, biyyee naannoo, bottii hojjettootaafi qaama meeshaalee dabalatee %31.75 keessattiifi *E. coli* ammoo %68.25 keessatti argame (Gabatee 1).

Uffataafi burusha qulqullinaa irratti *Salmonella* -n dhibamus, *E. coli* garuu baay'ee isaanii irratti waan argameef, adeemsa tatamsa'ina dhibee kanaaf gama namaanis qoodni akka jiru agarsiisa.

Sooranniifi bishaan dhugaatii irrattis faalamni kan mul'ate yoo ta'u, saamuda fudhatame keessatti %17.95–36.96 *Salmonella* fi %50–74.40 *E. coli* argamuun, booyyeen balaa dhibeef akka saaxilamu lamaanuu qooda qaban mul'isa. Tuttuqqiin bineensota bosonaa yaaddoo dabalataa ta'ee mul'ateera. Saamudni bobbaa allaattiwwan naannoo ooyruutii argame *Salmonella* -n %40 keessatti, *E. coli* ammoo %70 keessatti argamani. Argannoowwan kunneen bu'aa sakatta'insa booda taasifameen hojjettoonni akka allaattiwwan mooraa hinseenne ittiin to'atamu akka hinjirre %92 argame faana dhiheenyaan wal fakkaata. Dhibeewwan walirra mudachuun kan barama: *Salmonella* fi *E. coli* lamaaniifuu saamudni hundi dhugaa ta'uun, karaa faalamaa wal-irratti mul'achuu fi gosoota saamudaa, naannoofi garee bineensotaa keessatti karaaleen daddarboo dachaa jiraachuu isaanii calaqqisiisa.

Xiinxalli dabalataa akka agarsiisutti faalamni kutaalee mana booyyee hunda keessatti garaa garummaa qaba. Manneen booyyee saddeet keessaa torba keessatti baay'inni *Salmonella* %18.84 hanga %40 kan ture yoo ta'u, qorannoon manni tokko negaatiivii yoo ta'u, *E. coli* ammoo manneen saddeet hunda keessatti booyyee %49.30–80.00 irratti argameera.

Ragaan to'annoofi amala hojjetaa argannoowwan microbiological caalaatti ibse. Hojjettoonni %84 booyyee kutaa addaa keessatti akka eegan kan himan yoo ta'u, %72 ammoo bineensota kanaaf kunuunsa fayyaa beeyladaa akka argatan himaniiru. Namoota deebii kennan keessaa %80 hantuuta ykn ilbiisota akka hinto'anne, %60 bakka hojiitti waan miilatti godhatan addatti akka hinqabneefi %68 ammoo naannoo booyyee seenuu isaniin dura harka ykn miila akka hindhiqanne ibsaniiru. Hubannoo waa'ee daddarbiinsa zoonotic gadi aanaadha: hojjettoonni %28 qofti dandeettii zoonotic *Salmonella* kan beekaniifi %36 *E. coli* beeku. Qaawwi hunannoo kunniin, gochaalee qulqullinaa gahaa hintaaneefi qaqqabummaa bineensota bosonaa to'annaa hinqabneen walitti makamuun, dhibeen (pathogen) jiraatuufi babal'atuuf haala mijataa uume.

Gabatee 1: Saamuda fudhataman keessatti mudannoo *Salmonella* fi *E. coli*.

Madda Saamudaa	Lak. Saamuda Qoratamee	Lak. (%) Positive for		χ^2 **	p-Value **
		<i>Salmonella</i>	<i>E. coli</i>		
Booyyewwan	146	37 (25.34)	73 (50.00)	18.90	<0.001
Sooraafi bish. dhugaatii	85	24 (28.24)	52 (61.18)	18.66	<0.001
Naannoo	63	20 (31.75)	43 (68.25)	16.79	<0.001
Ida'ama	294	81 (27.55)	168 (57.14)	52.73	<0.001
χ^2 *		0.93	6.78		
p- value *		0.63	0.03		

* Sababoota balaa hunda keessatti amantaa %95 irratti; ** sababa balaa ilaalame keessatti *Salmonella* fi *E. coli* adda baafamuu gidduutti amantaa %99 irratti.

Ragaaleen walitti fidaman: orgaanizimoonni xixiqqoo babal'achuu, qindaa'ina faalama naannoo, bineensi bosonaa qooda qabaachuufi ragaaleen hojjettootaa akka mul'isutti dhibeewwan akka jiraataniifi booyyee, namaafi naannoo gidduu naanna'uun sirna ikkoof (ecosystem) balaa guddaa ta'uu mul'isa. Faalamni soorata, bishaan, qaama bineensonni tuqaniifi argaminsa bineensa bosonaa uumamaa kan calaqqisiisan, dhibeewwan to'achuuf booyyee qofa irratti xiyyeeffachuurra qabxiilee daddarbinsaa hedduu akka barbaadudha.

Akka qorannoon mul'isutti *Salmonella* fi *E. coli*-n faalamuun booyyee, soorata, bishaan, qaamolee naannoofi bineensa bosonaa eegumsi naannoo hanqachuu, qulqullina eeggannaan hojjettootaa dhaabbataa ta'uu dhabuufi allattiwwaniifi gosa antuutaa ga'umsaan toachuu dhabuu irraa maddani. Tatamsa'inni *E. coli* baay'ee ol'aanaa ta'uun isaa dandamachuu naannoo isaa kan calaqqisiisu yoo ta'u, gosoota saamuda hunda keessatti waliin mul'achuun dhibeewwan lamaanii karaalee isaan bakka horsiisaatti itti daddarban wal xaxaa ta'uu mirkaneessa.

Yaada Imaammataa

- Ministeerri Qonnaa fi Inistiitiyuutiin Fayyaa Beeyladaa balaa daddarbiinsa *Salmonella* fi *E. coli* hir'isuuf qulqullina ooyruu bu'uuraafi hojiiwwan eegumsa naannoo cimsuu qabu.
- Faalam nyaata, bishaaniifi bakka jireenyaan wal qabatanii mudatan hanqisuuf, naannoon hormaataa sagantaa qulqullinaa idileefi to'annoo naannoo salphaa hojiirra oolchuu qabu.
- Abbootiin qabeenyaa horsiisa booyyee simbirroonni bosonaafi hantuutni akka hinseenne dhorkuu ilaalcha keessa galchuu qabu.
- Ogeeyyiin beeyladaa balaa zoonotic fi amala qulqullinaa barbaachisoo ta'an irratti hojjettoota bakka horsiisaaf hubannoofi leenjii qabatamaa kennuu qabu.



YUUNIVARSIITII HARAMAAYAA

BIIROO DHIMMA QORANNOO

IBSA IMAAMMATAA 2.1

Caamsaa 2018

GOOROO
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II

Farra Baakteeriyaa Ajajaan ala Argachuufi itti Fayyadama Seeraan Alaa Baha Itiyoophiyaa keessatti: Yaaddoo Fayyaa Hawaasaa Dabalaa Dhufe

Duumeessaa Edeessaa^{1,2}, Fakadaa Asaffaa Kumsaa^{2,3}, Girmaayee Dhiinsaa^{2,4}, fi Lameessaa Oljirraa²

¹Mana Barumsaa Faarmaasii, Kolleejjii Saayinsii Fayyaa fi Wal'aansaa, Yuunivarsiitii Haramaayaa, L.P.B. 235, Harar, Itoophiyaa.

²Mana Barumsaa Fayyaa Hawaasaa, Kolleejjii Saayinsii Fayyaa fi Wal'aansaa, Yuunivarsiitii Haramaayaa, Harar, Itoophiyaa.

³Giddu-gala Barnoota Fayyaa Yuunivarsiitii Teenessii - Laaboraatarii Biyyaalessaa Ook Riij (UTHSC-ORNL) Giddu-gala Informatiksii Baayoomediikaalaa, Kutaa Barnoota Dhukkuboota Daaimmanii, Kolleejjii Medisiinii, Meemfiis TN, USA.

⁴Piroojeektii Finoot, Kutaa Barnoota Fayyaa Addunyaa fi Baay'ina Hawaasaa, Mana Barumsaa Fayyaa Hawaasaa Haarvardii T. H. Chan, Finfinnee, Itoophiyaa.

Ergaawwan Ijoo

- Fayyadamtoota farra baakteeriyaa yeroo ammaan gara %45 ta'an haala hinmalleen qoricha kana argatu, %51 ammoo haala hintaaneen tajaajilamu.
- Daa'imman umrii shanii gadii farra baakteeriyaa haala hintaaneen fudhatan balaan isaa 1.48n dachaa garee umrii kaaniidha.
- Hawaasni baadiyyaa %26n kanneen magaalaa jiraatanirra farra baakteeriyaa haal malee tajaajilamu.
- Namoonni hinbaranneefi barnoota sadarkaa gadii qofa qaban %34n farra baakteeriyaa haala hintaaneen tajaajilamu.
- Maddi farra baakteeriyaa ajajaan alaa dukaana shaqaxaafi dawaa yoo ta'u, kan dukaana shaqaxaa %32tu tajaaila haalmaleef oola.

Seensa

Waggoota kurnan darbaniif farra baakteeriyaa tajaajilamuun akka addunyaatti %46n dabale, ega weerarri vaayireesii koronaa (COVID-19) mul'atee qabatamaan guddate. Farri

baakteeriyaa miidhama baakteeriyaa mudatu ittisuufi yaaluuf barbaachisoo ta'anis, biyyoota dinagdeen hinguddanne keessatti haalli itti fayyadama isaa harki caalaan fudhatama hinqabu.

Akka qorannoon mul'isutti farra baakteeriyaa ujummo argansuu gara olii jiran yaaluuf oolan keessaa %50 ol haal-malee ta'uufi akk sakatta'insi tooftaa addaan argametti %40 ol dhukkuboota of daangessaniif haala sababeessuun hindanda'amneen farri baakteeriyaa tajaajilaniiru. Farra baakteeriyaa haal-malee tajaajilamuun dawaa dandamannaan (DD) mudachuuf ga'ee olaanaa taphachuun, du'aatii miiliyona 1.27 fi bara 2019 akka addunyaatti miiliyona 4.95f sababa ta'eera. Farra baakteeriyaa haala dansaan tajaajilamuu leellisuun akka addunyaatti jiraatus, Afrikaan DDn wal qabatee du'aatiin lakkoofsa olaanaa galmeessuun itti fufteetti. Dhaabbanni Fayyaa Addunyaa (WHO) sadarkaa hawaasaatti itti fayyadama farra baakteeriyaa olaantummaa kennee kan qortu n fudhatee yoo ta'u, Itiyoophiyaan sakatta'insaafi qo'annoowwaniin

ragaalee cimsuuf kutannoon hirmaatti. Itiyoophiyaatti, itti fayyadamni farra baakteeriyaa itti gaafatamummaan akka ta'uu qabu qaamni qoricha dhiheessan gorsuun irraa eegamus, farra baakteeriyaa ajajaan ala argachuu, qaama eeyyama hinqabneefi haalmalee tajaajilamuun dabalaa deeme. To'annaan farra baakteeriyaa hanga ammaatti buufata fayyaatti kan daanga'e ta'us, barsiifata sadarkaa hawaasaatti taasifamu laaffisee ilaaleera. Kanaafuu, qorannoon hawaasa giddu galeeffatee taasifamu kun gama hubannoo fayyadamtootaan amala isaanii madaaluu, mala to'annoo isaaf odeeffannoo dabarsuuf ragaa dhiheessuu.

Malaafi Argannoo

Qorannoon qaxxaamuraa hawaasa giddu galeessa godhate baadiyyaa Haramaayaafi magaalaa Harar keessaa mala iddattoo kilaastera tartiibaan abbaa worraa 2,256 hirmaachisuun gaggeeffame. Ajajaan alas ta'e qaama eeyyama hinqabne irraa farra baakteeriyaa argachuun seeraan ala.

Farra baakteeriyaa haala malee tajaajilamuun dhibeewwan baakteeriyaa hindhufne (akka utaalluu ykn dufkaka) ykn dhibeewwan baakteeriyaa mudatanii farri baakteeriyaa gonkumaa hibarbaanneef fudhachuu fida.

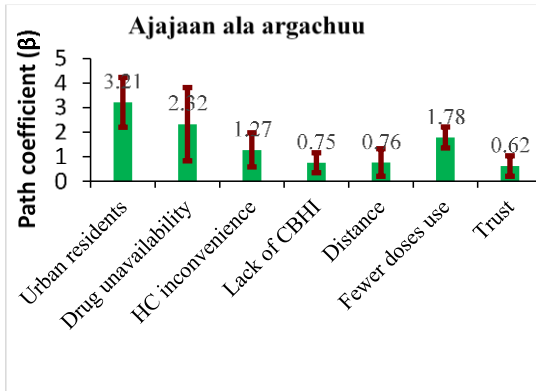
Itti fayyadamni farra baakteeriyaa qajeelfama barbaachisummaa isaa International Classification of Diseases-10 Clinical Modification (ICD-10-CM) irratti maxxanfame irratti hunda'uun, koodii qorannoo sababni hinbeekamne waliin hidhata kan qabu yoo jiraate galmee haalmalee tajaajilamuu waliin madaalama. Moodeloota istaastistikii sirrii ta'e tajaajilamuun agarsiiftuwwan farra baakteeriyaa sirrii hintaane itti argamuufi itti fayyadama hinbarbaachifnee adda ba'aniiru.

Harki caalaan deebi-kennitootaa shamarran (%83.8), umriin 20-39 (%59.8), kan eeruman (%79.9) fi kan baadiyyaa jiraatan (%61). Baay'inni isaanii walakkaatti kan dhihaatu (%45.5) barnoota idilee kan hinqabneefi (%46.7) mana oolu (Gabatee 1).

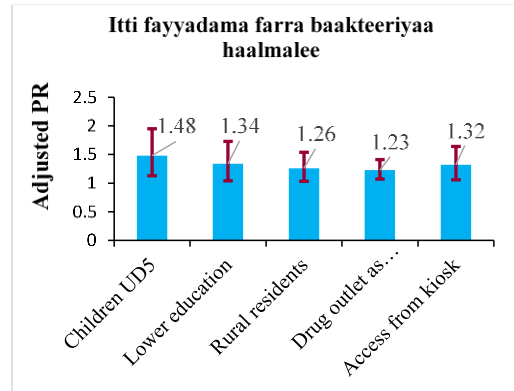
Gabatee 1: amaloota seenduubee hirmaattota qorannoo baha Itiyoophiyaa, 2023.

Amaloota	Qoodaminsa	N (%) (ida'ama=2,256)
Umrii deebi-kennitootaa (waggaan)	< 20	123 (5.5)
	20-39	1350 (59.8)
	40-59	573 (25.4)
	≥ 60	210 (9.3)
Koorniyaa	Dhiira	366 (16.2)
	Dhalaa	1890 (83.8)
Haala gaa'elaa	Gonkumaa gaa'ela kan hingodhanne	191 (8.5)
	Kan fuudhe/eerumte	1803 (79.9)
	Kan irraa du'e	185 (8.2)
	Kan adda bahan	77 (3.4)
Sadarkaa barnootaa	Barnoota idilee hinqabu	1026 (45.5)
	Sadarkaa tokkoffaa	685 (30.4)
	Sadarkaa lammaffaa	319 (14.1)
	Koollejji/digirii	226 (10.0)
Hojii/dalahgaa	Hinqabu/barataa	195 (8.6)
	Qonnaan bulaa	529 (23.5)
	Mana keessa	1053 (46.7)
	Miindeffamaa	237 (10.5)
	Daldalaa	165 (7.3)
	Kanbiroo*	77 (3.4)
Naannoo jireenyaa	Baadiyyaa	1381 (61.2)
	Magaalaa	875 (38.8)
Miseensummaa WFHB abbaa worraa	Eeyyee	1696 (75.2)
	Lakki	560 (24.8)

Kanbiroo*: hojii guyyaa, konkolaachisaafi hojii ogummaa, WFHB= wabii fayyaa hawaasa bu'uureffate



(A)



(B)

Fakii 1: Dhiibbaa sababoota farra baakteeriyaa ajajaan ala argaman fayyadamuu (A) fi calaqqeewwan haala malee tajaajilamuu (B) hirmaattota qorannoo, baha Itiyoophiyaa, 2023.

Namoota 1,245 farra baakteeriyaa yeroo dhihootti fudhatan keessaa, 565 (%45.6) haala sirrii hintaaneen yoo argatan, 636 (%51.1) haala hinbarbaachifneen fayyadamu. Dawaa ajaja malee fudhachuun kanneen baadiyyaa jiraata kan magaalaa jiraatan dachaa sadiin ($\beta=3.21$) caala, dawaan barbaachisoo mana yaalaa hawaasaa keessaa dhibuun ($\beta=2.32$), tajaajilli eegumsa fayyaa rakkoo qabaachuu ($\beta=1.27$) fi wabii fayyaa hawaasa irratti hundaa'e dhabuun ($\beta = 0.75$) carraa antibayotikii sirrii hin taane argachuu waliin walqabatee dabaluu mul'ate, garuu bu'aan $\beta = 0.75$ guddina ifaa agarsiisu miti. Dabalataan, qaama eeyyama hinqabne irraa dawaa argachuun kan hawaasa baadiyyaa dachaa lamaan caala ($\beta=2.14$), ammoo dubartoota biratti beekama ($\beta=1.15$).

Daa'imman umrii shanii gadii %48n (APR: 1.34), jiraattonni baadiyyaa %26n (APR: 1.26), namoonni barnoota gadaanaa %34n (APR: 1.34) fi kan farra baakteeriyaa dukaana shaqaxaatii fayyadaman %32n (APR: 1.32) farraa baakteeriyaa haala hintaaneen fayyadamuuf carraa olaanaa qabu (Fakii 1).

Yaada Imaammataa

- Ministeerri Fayyaafi biiroon fayyaa naannoo, sadarkaa hawaasaatti warra dhiheessan kanneen akka manneen gurgurtaa dawaafi kilinikoota dhuunfaa dabalachuuf to'annoo farra baakteeriyaa babal'isuu qabu.
- Abbaa taayitaa qorichaafi nyaata Itiyoophiyaafi qaamonni dhimmi ilaallatu hundi farri baakteeriyaa ajajaan qofa akka ta'uu qabu daangessuufi gurgurtaan qorichaa eeyyamaan alaa dhorkuu, innis naannoo baadiyyaa seer-malummaan itti babal'ate irratt xiyyeeffachuu dabalatee irraii hojjechuu qabu.
- Ministeerri Fayyaafi aangawoonni fayyaa sadarkaa gadii itti fayyadama farra baakteeriyaa haal malee hir'isuuf hawaasa baadiyyaa, dubartoota, haadholee daa'ima xixiqqoo qabaniifi namoota barnoota gadaanaa qabaniif sagantaa leenjii barnootaa uumuufii qabu.



YUUNIVARSIITII HARAMAAYAA

BIIROO DHIMMA QORANNOO

IBSA IMAAMMATAA 2.2

Caamsaa 2018

GOOROO
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II

Naannoo Qabeenyi Muraasni Jiru keessatti Mala Ittisa Ulfaa Fooyyessuu: Giddu Seensa Aadaan Fudhatama Qaban Tajaajilamuu

Taarikuu Diingataa¹, Galaanaa Maammoo¹, Alamaayyoo Dheeressaa¹, Moohaamad Yuuyyaa¹, Taaraa Wiilfoongi¹

¹Kolleejjii Fayyaa fi Saayinsii Meedikaalaa, Yuunivarsiitii Haramaayaa, Itoophiyaa

Ergaawwan Ijoo

- Ega Mala Guyyaa Daanga'aa (MGD) deeggarsa Geengoo Dooqaan gidduu seenamee ittisa ulfaa tajaajilamuun sarara bu'uuraa %28.9 irraa %64.5tti guddate.
- Ega MGD deeggarsa Geengoo Dooqaan gidduu seenamee booda hirmaannaan dhiirafi mariin hiriyyaa %14 gara %66.1tti guddate.
- Barnoonni idilee shamarranii, ittisa ulfaa irratti ilaalcha gaarii qabaachuu, gahumsa dhuunfaa olaanaafi dhiirri si'oominaan hirmaachuun agarsiiftuwwan jajjaboo ittisa ulfaaf oolanidha.

Seensa

Biyyoota galii gadaanaafi giddu galeessa keeaaastti shamarran naannoo miiliyona 12 umrii 15-19 fi umrii 15 gadii 777,000 ol woggaatti nida'u, rakkoo ulfaan wal qabatee jiruun du'aatii shamarran umrii 15-19f sababa hangafadha (WHO, 2023). Ulfa itti hinyaadamiin mudate hir'isuufi fayyaa haadhaafi daa'imaaf fooyyessuuf ittisi ulfaa tooftaa gaarii waan ta'eef, mala gara garaa waantota yeroo dheeraaf tajaajilanii hanga tooftaa dammaqina qophii killeetti dhihaateera. Dammaqinsi Mala Qophii Killee (DMQK), kanneen akka Mala Guyyaa Daanga'aa (MGD) shamarran mataa isaaniin guyyoota 8-19 ulfaaf

banaa ta'an adda baafachuun kara wal qunnamtii saalaa ofeeggannoo hinqabne irraa of qusachuun ulfa itti hinyaadamne ittiin hanqisanidha. Meeshaaleen akka Geengoo Dooqaa, bara 2001 beeksifame, shamarran haala salphaan guyyaa ulfaaf banaa ta'e akka adda baafataniifi fayyadama sirrii fooyyesse (Weis & Festin, 2020).

Biyyoota Sahaaraa gadii, bakka baay'inni uummataa cinaa ol shamarran ta'aniifi hedduun umrii 18 gaditti eeruman, daa'imummaan haadha ta'uufi ulti itti hinyaadamne rakkooowwan akka du'aatii haadhaafi daa'imaaf itti mudatudha. Kun utuu jiruu, itti fayyadamni ittisa ulfaa naannoo baadiyyaa sababoota oduu durii (myth), rakkoo ittiin wal qabatee dhufu sodaachuu, hubannoo daanga'aafi hiriyyaan itti walii galuu diduu irraa kan ka'een gadi bu'aadha (Cornet, 2013; Kennedy et al., 2011). Hawaasa giddu galeeffachuun MGD fi Geengoo Dooqaa jajjabeessuun abdiif fedhi dabaluu, mariin hiriyyootaa fooyya'uufi oduun durii kana morman akka hafan mul'atanis, sadarkaan itti madaqinsaa hawaasa barnoota gadaanaafi baadiyya biratti gadaanaadha.

Hanqinoonni kunneen jiraatanis, MGD salphaa ta'ee kan dhihaate, rakkoo ittiin wal qabatee dhufu kan hinqabne mala hormoniif filannoo dabalataati. Aadaan fudhatama kan qaban, gatii xiqqaa kan ta'an akka Geengoo Dooqaa tajaajila fayyaa hawaasaa Hojjetoota Ekisteenshinii Fayyaatiin durfamu keessatti walitti makuun

fudhatamaafi itti fayyadama sirrii ta’e guddisuu danda’a. Malli kun bu’aa filannoo ittisa ulfaa bal’isuu, ulfa itti hinyaadamiin hir’isuufi kallattiin fayyaa haadhaafi daa’imaa shamarran Itiyoophiyaafi kanneen galumsa wal fakkaataa qaban fooyyessuuf karoofame.

Malaafi Argannoo

Qorannoo kanaan ga’umsa Geengoo Dooqaa MGD makate sakatta’uuf mala qorannoo yaaliiti hojiirra oole. Aanaa Qarsaa, baha Itiyoophiyaa, Amajjiifi Hagayya 2023 gidduutti gaggeeffame. Ida’amaan shamarran reefuu eeruman (165 garee yaaliin irratti taasifameefi 165 garee to’annoo jala jiran) adeemsa iddattoo tasaan Galmee Seenaafi Qorannoo Fayyaa Qarsaa keessaa filatamani. Giddu seensi kan taasifame hojjetoota ekisteenshinii fayyaa Geengoo Dooqaa tajaajilamuun MGD irratti gorsaafi barnoota kennaniini. Barnoonni kan irratti xiyyeeffate marsaa laguu/baatii beekuu, guyyaa ulfaaf banaa ta’e adda baasuufi tooftaa guyyaa ulfaa to’achuu, of qusachuufi waantota gara garaa tajaajilamuu of keessaa qaba. Akkasumas, kara manaa deemuun marii abbaa warraafi haadha warraa jajjabeessuu, safuu koorniyaa hanqisuufi oduu durii ittisia ulfaan wal qabatan balleessuuti taasifame. Hojjettoonni ekisteenshinii fayyaa akkaataa aadaan akka gorsanniifi dhiironni ittisia ulfaafi murtoo kenninsa irratti akka hirmaatan kakaasuu irratti leenjii fudhatani. Ragaan kan funaaname daangaa baatii ja’aafi baatii kudha-lamaa adeemsa bar-gaaffii qindaa’aa, marii garee xiyyeeffannoofi af-gaaffii gadi fagooni.

Giddu seensa taasifameen itti fayyadamni ittisa ulfaa hirmaattotaa haalaan dabale. Dursa, dubartoota %28.9tu ittisa ulfaa akka tajaajilamantu gabaafame. Geengoo Dooqaa MGD deeggare beeksisuu hordofee, fayyadamni ittisa ulfaa %64.5tti kan guddate, ga’umsa giddu seensi danqaawwan jiran hojjetame agarsiisa.

Ega giddu seensi taasifamee dubartoonni barnoota idilee qaban ittisa ulfaa tajaajilamuuf dacha sadii oliin carraan jiraachuu qorannoon kun mul’isa (AOR = 3.42). Dubartoonni ittisa ulfaa irratti ilaalcha gaarii qaban itti fayyadamuuf carraa dachaa shanii qabu (AOR = 5.21), akkasumas gahumsa dhuunfaa olaanaa kan qaban naannoo dachaa shanii mala ittisa ulfaa madaqfachuuf qabu (AOR = 4.83).

Dhiira hirmaachisuun jijjiirama olaanaa kan fide, dubartoota abbaan manaa ittisa ulfaa irratti murtoo kennuu keessatti hirmaate carraa dacha ja’aa ittisa ulfaa tajaajilamti (AOR = 6.11) (Gabatee 1). Ittisa ulfaa tajaajilamuu caalaa, giddu seensichi marii worraafi hirmaaddaa dhiiraa daran dabale. Jalqaba irratti dubartoota %14 qofatu ittisa ulfaa tajaajilamuuf hirmaannaa abbaa warraa qaba. Lakkoofsi kun giddu seensa booda gara %66.1tti guddate. Dubartoonni ga’umsa dhuunfaa olaanaa qaban abbaa warraa isaanii waliin mari’achuufi hirmaannaa dhiiraa gabaasuuf naannoo dachaa ja’aa carraan uumame (AOR = 5.87). Hubannoo MGD fi ilaalchi gaarii ittisa ulfaa hirmaannaa gaarii abbaa warraafi haadha warraa waliin walitti hidhata.

Argannoowwan kunneen amala wal hormaataa keessatti barbaachisummaa xiinqalbii hawaasummaafi qooda waliin mari’achuun qabu guddisanii agarsiisu. Ragaaleen akkamtaa giddu seensi taasifame oduu durii ittisa ulfaa irratti jiru balleessuu, sodaa dhibee cinaan dhufu hir’isuufi wal amantaa abbaafi haadha warraa gidduu jiru cimse agarsiisuun ragaalee akkamtaa kana cimsani. Dubartoonni itti fayyadama ittisa ulfaa irratti walii galuuf ofitti amanamummaan isaanii dabaluufi dhiironnis murtoo karoora maatii irratti deeggaruuf fedha olaanaa calaqqisiisuuti gabaafame. Akkaataan dhiheenya mala aadaa, adeemsa hawaasa giddu-galeeffateen kennamuun, ga’umsa kana fiduuf meeshaa ta’aniiru.

Argannoon qorannoo kanaa akka mul’isutti mala wal hormaataa hubannoo irratti hundaa’ee, kan akka MGD, naannowwan dinagdeen gad bu’oo ta’an keessatti rakkoo jiru furuuf humna qabu. Adeemsa giddu seensa Geengoo Dooqaa sagantaalee fayyaa hawaasaatti makuufi abbootii worraa si’oominaan hirmaachisuun, murtoo wal hormaataaf kennamu keessatti odeeffannoo qabaachuun akka ta’e haalonni uumamaniiru. Barnoonniifi gahumsi dhuunfaa milkaa’inaaf isaan ijoo ta’anii, giddu seensi beekumsaafi ofitti amanamummaa dubartootaa ijaaruu akka angafaatti fudhatanii irratti hojjechuu akka qaban agarsiise. Keessattuu hirmaannaan dhiiraa dhiibbaa kan uume yoo ta’u, kunis safuu koorniyaatti gufuu kan ta’aniifi karoora maatii irratti itti gaafatamummaa waliinii kan jajjabeessan barbaachisummaa tooftaalee hiriyoottan gaa’elaa cimsuuni. Argannoowwan kun dabalataan imaammata fayyaa wal hormaata Itoophiyaaf yaada bal’aa qaba.

Mala makaa ittisa ulfaa biyyoolessaa keessatti MGD hammachiisuun dubartoota malleen hormooniin ala fedhaniif filannoowwan babal'isuu danda'a, kanaanis fedhii hinguutamneefi ulfa hinyaadamne hir'isuu

danda'a. Kana malees, milkaa'inni giddu-galummaa kanaa caasaa fayyaa hawaasaa jiru, kan akka Sagantaa Ekisteenshinii Fayyaa, waan baasii xiqqaafi guddinaan madaalawaa ta'e dhiyeessuuf faayidaa akka qabu agarsiisa.

Gabatee 1: Giddu seensa booda agarsiiftumman itti fayyadama ittisa ulfaa, 2025

Amaloota	Qoodaminsa	AOR (95% CI)
Umrii	15–24 (Wabiil)	Wabiil
	25–35	1.76 (0.73–4.24)
Bakka jireenyaa	Baadiyyaa (Wabiil)	Wabiil
	Magaalaa	1.59 (0.58–4.38)
Amantaa	Ortodoksii (Wabiil)	Wabiil
	Musliima	1.82 (0.38–8.71)
Barnoota idilee	Hinqabu (Wabiil)	Wabiil
	Qaba	3.42 (1.40–8.37)**
MGDf abbaa	Lakki (Wabiil)	Wabiil
	Eeyyen	1.94 (0.82–4.58)
Ilaalcha sirrii	Hinqabu (Wabiil)	Wabiil
	Qaba	5.21 (2.01–13.49) *
Jabina dhuunfaa	Hinqabu (Wabiil)	Wabiil
olaanaa	Qaba	4.83 (1.91–12.19) *
Marii worraa gaarii	Hinjiru (Wabiil)	Wabiil
	Hinjiru	2.16 (0.86–5.42)
Hirmaannaa dhiiraa	Hinjiru (Wabiil)	Wabiil
	Jira	6.11 (2.30–16.21) *

Yaada Imaammataa

- Ministeerri Fayyaafi biirooleen fayyaa naannoo sagantaalee barnoota ittisa ulfaa aadaan fudhatama qaban kan akka mala Geengoo Dooqaa kan hariiroo hiriyoottan gaa'elaa fooyyessuu guddisuu qabu akkasumas, malleen karoora maatii aadaan fudhatama qaban kan akka MGD Geengoo Dooqaa waliin paakeejii ekisteenshinii fayyaa jiru keessatti hammachuu qabu.
- Dhaabbileen dhimmi ilaallatu oduuwwan durii balleessuufi filannoowwan ittisa ulfaa miidhaa hinqabne kan akka MGD Geengoo Dooqaan deeggarama irratti naannoo baadiyyaafi hawaasa barnoota gadaanaa qaban biratti duula hubannoo uumu taasisuu qabu.



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II

Yeroo Ulfaa Dhiiga Dhangala'u: Yaaddoo Cal'eensaa Haadhaafi Daa'immanii Baha Itiyoophiyaa

Hayimaanot Mazimuur¹, Maalladaa Taffarraa¹, Addaraa Dabalaa¹, fi Lattaa Daggifaa¹

¹Kolleejjii Fayyaa fi Saayinsii Meedikaalaa, Yuunivarsiitii Haramaayaa, Itoophiyaa

Ergaawwan Ijoo

- Baha Itiyoophiyaa keessatti ulfa 100 keessaa 8 kan ta'u osoo hindhalatiin dhiigni cimaan kan dhangala'u irra caalaa handhuurri gadameessa irraa yeroo malee addaan ba'uu (%50.7) fi naannoo ulaa gadameessaa ta'uu ykn cufuu (%44.9) irraa kan ka'edha.
- Yeroo ulfaa dhiiguun yeroo hedduu raakkoolee jajjaboo akka daa'imni yeroo malee dursee dhalachuu (%43.5), ulfaatina xiqqaa (%26.1), haadhooliin garaa baqaqsanii hodhuu barbaaduu (%55.1) fi haadhooliitti hir'ina dhiigaa fiduutti (%42) geessa.
- Dhiigni yeroo ulfaa dubartoota seenaa ulfaa hedduu qaban, baqaqsanii hodhuun da'an, ulfaa'uu gidduu yeroon gabaabbachuu (baatiilee 24<) fi yeroo ulfaa kan jimaa qama'an irratti baay'ata.

Seensa

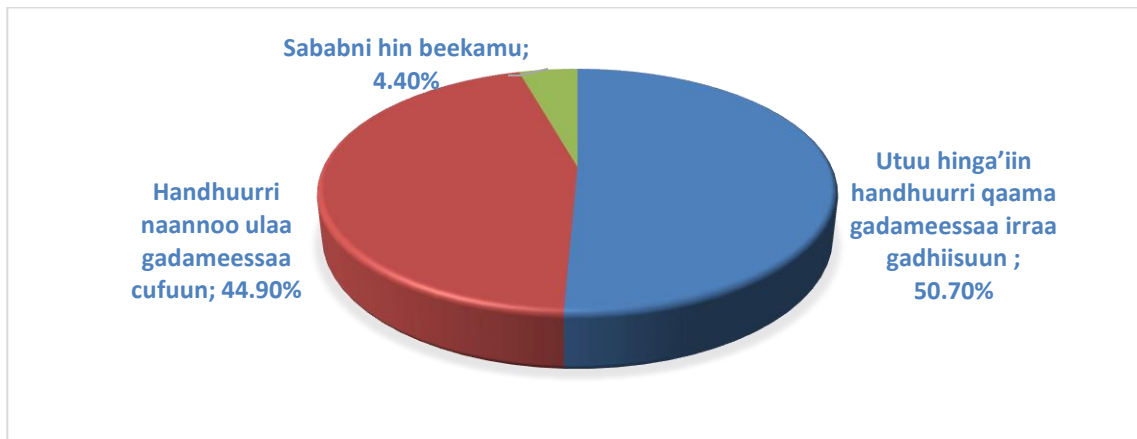
Dhiigni yeroo ulfaa, kan akka da'umsa duraafi boodaa, Itoophiyaa keessatti du'aatii haadhooliifi daa'imman reefuu dhalataniif gumaacha olaanaa taphachuun, biyyattii keessatti lakkoofsi du'atii ol'aanaa akka ta'u taasise. Du'aatii haadholee keessatti ga'ee olaanaa kan qabu dhiigni dhangala'uu yoo ta'u, kun akka hammaatu kan taasise hordoffii ulfaa yeroo irrattiifi qulqullina dhabuudha. Dhiigni yeroo ulfaa hammaataan utuu guyyaan hinga'iin da'uu, ulfaatinni isaanii gadi bu'aa ta'uufi ukkaamamuu (asphyxia) tti waan hidhatuuf, du'aatii daa'imman reefuu

dhalataniif sababa ta'a. giddu seeninsi tajaajila fayyaa haadholee guddachaa jiraatus, mudannoo dhiiga yeroo ulfaa du'aaf kennan kanneen hanqisuun danda'amuuf yaala yeroo ulfaa, yaala hatattamaa da'umsaan wal qabataniifi hubannoon sadarkaa hawaasaatti akka uumamu gochuun rakkoo hamaa kana gahumsaan furuun nidanda'ama. Qorannoon kun kan karoorfame, dhiigni da'umsa duraa (DhDD) sadarkaa, waan isaan hidhata qabataniifi rakkoo kana hordofee waan mudatu sakatta'uu ta'ee, beekumsaan wal qabatee qaawwa jiru agarsiisuufi giddu-seensa ragaa irratti hundaa'een fayyaa haadholeefi daa'imman reefuu dhalataniifi fooyyessuu irratti.

Malaafi Argannoo

Qorannoon hordoffii fuuldrattii dhaabbilee hospitaalota mootummaa afur Naannoo Harariifi Bulchiinsa Magaalaa Dirre Dawaa keessatti Eblaa hanga Waxabajji 2023tti gaggeeffame. Humnaafi hanga hospitaalotaalonni baatanii jiran waliin wal simsiisuun iddatto carraa tooftawaan walumaa galatti dubartoota dahan 882 hirmaataniiru. Ragaaleen afgaaffii fuulaa fuulaafi adeemsa bargaaaffii qindaa'aan galmeewwan yaalaa sakatta'uun funaanamani.

Hangi dhiiguu yeroo ulfaa waliigalatti %7.8 ture. Kanneen keessaa, utuu hinga'iin handhuurri qaama gadameessaa irraa gadhiisuun %50.7n galmaa'uun isa hangafa, kana kan hordofu handhuurri naannoo ulaa gadameessaa ta'uu ykn cufuun %44.9 ta'ee, %4.4 ammoo sababni hinbeekamu (Fakii 1).



Fakii 1: Sababoota dhiiguu yeroo ulfaa hirmaattota qorannoo irraa.

Sababoota walitti hidhatanii dhufaniin dubartoonni yeroo shaniifi isaa ol ulfaa'anii beekan dhiiguu yeroo ulfaa kanneen yeroo jalqabaaf ulfaa'an faana yoo wal bira qabamu naannoo dachaa shaniin carraa isaan udachuuti mul'ate (AOR = 4.91). Haala wal fakkaatuun, dubartoonni seenaa baqaqsanii hodhuu qaban dachaa afurii oliin DhDD kanneen seenaa kana hinqabne caalu (AOR = 4.45). Yeroo gabaabaa ulfa gidduu jiru kan baatii 24 gadii dhiiguu yeroo ulfaa waliin hidhata guddaa kan qabu, carraa mudannoo isaa dachaa shanii oliin dabala (AOR = 5.30). Yeroo ulfaa jimaa qama'uun carraa yeroo ulfaa dhiiguu dacha lamaa oliin akka dabaluu taasisa (AOR = 2.39).

Dubartoota dhiigi yeroo ulfaa mudateen wal qabatee haalli haadhaafi daa'imaa hammaataa ture. Dubartoota kanaan hubaman keessaa harki cinaa ol (%55.1) yaala baqaqsanii hodhuun yoo da'an, %42 ammoo hir'ina dhiigaati mudate. Da'umsa boodas rakkoon daa'immanii olaanaa yoo ta'u, daa'imman %43.5 yeroo malee dursanii dhalatani, %26.1 ammoo ulfaatina gadaanaan kan dhalatan jalatti qoodamani. Argannoowwan kunneen dhiiga yeroo ulfaafi rakkoowwan ittifamuu danda'an kan inni hidhata jabaa waliin qabu irratti barbaachisummaa yaalaafi fayyaa hawaasaa agarsiisu.

Hospitaalota afur keessatti dhiiga yeroo ulfaa %8 ta'uun rakkoon qabatamaa baha Itiyoophiyaa jiraachuu mul'isa. Handhuurri gadameessa irraa yeroo malee gadhiisuufi naannoo ulaa gadameessaa ta'uu ykn cufuun waantota akka addunyaatti jirani, ta'us hangii fi faca'insi isaa balaa adda baasuu, itti fufinsa yaala da'umsa duraafi qophii rifeeriif jiruun wal qabatee hanqinni jiraachuu mul'isa. Hidhata jabaa yeroo hedduu ulfaa'uu, yaala baqaqsanii hodhuufi ulfaa'uu gidduu yeroon gabaabbachuun karoora maatii da'umsa boodaa, gorsa balaa yaala baqaqsanii yaaluu duraafi tajaajila yeroo da'umsaa addaan fageessuu yaala da'umsa duraafi boodaa

waliin taasisuun carraan rakkoolee kanneen ittisuun jira.

Yaada Imaammataa

- Ministeerri Fayyaa fi biirooleen fayyaa naannolee sagantaalee yaala duraa balaa dhiiga yeroo ulfaa adda baasuu walitti fiduufi yeroon rifeerii kennuufi yaala hariifachiisaa da'umsaan wal qabatuuf qophaa'ummaa jajjabeessuu qabu.
- Ministeerri Fayyaa fi biirooleen fayyaa naannoo hojjetoota fayyaatiif, madaallii sakatta'insa balaa dhiiga yeroo ulfaa, pirootokoolii ittiin tasgabbeessaniifi haala rakkoolee itti to'atan irratti leenjii gahumsa irratti hundaa'e kennuu qabu.
- Qaamonni dhimmi ilaallatuufi michoonni giddu-galinsa da'umsa addaan fageessuufi hubannoo DhDDn balaa dhufanii, jijjiirama amalaafi tootaa jimaa itti dhiisan jajjabeessu kan hawaasa giddu gala godhate deeggaruu qabu.
- Ministeerri Fayyaafi biirooleen fayyaa naannoo, fooyya'insa itti fufinsa qabuuf hordoffii yaala dhiiga yeroo ulfaa, gahumsa rifeeriifi bu'aa deessuufi daa'ima dhalate irratti yaala jiran kallattii qabsiisuuf tooftaa hordoffiifi madaalliif dursa kennuu qabu.



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III

Meeshaalee Ijaarsaa Naannoon Wal Ta'uufi Baasii Salphaa Manneen Baadiyyaa itti Fufinsa Qaban

Hamzaa Ahmadnuur¹, Badhaasoo Ahmad¹, Ballaxaa Tafarraa¹, Zikira-aab Naggaa¹, Taammiraat Kabbadaa¹, fi Daawit Abbaate¹

¹Inistiitiyuutii Teeknooloojii Haramaya, Yuunivarsiitii Haramaayaa, Itoophiyaa

Ergaawwan Ijoo

- Biyyeen Baatee oomisha geopolymer-iif mijataa ta'uu mirkaneessuun, hanga aluminosilicate amala wal nyaatinsaa qabu 70–90% kan guuttatedha.
- Xuubiiwwan simmintoo irraa tolfaman faana yoo madaalamu, xuubiin geopolymer Baatee fooyya'an jabina giddu galeessaa kan ta'e 4.0 MPa guuta.
- Xuubiin geopolymer naannoo keessaa fooyya'e cimina MPa 3.4 galmeessisuun, mana jireenyaa baadiyyaa baasii xiqqaan ijaaruun akka danda'am agarsiise.

Seensa

Teeknooloojiin ijaarsa magariisaa mala kalaqaa amma mul'achaa jiruufi itti fufiinsa naannoos kan jajjabeessaa indaastirii ijaarsaa kan deeggarudha. Xiyyeeffannoon isaa meeshaalee ijaarsaa itti fufinsa qabu, baasii xiqqaafi naannoon wal ta'u qabiiyyee biyyee naannootti argamaniifi haftee oomisha warshaa tajaajilamuu guddisuudha. Sekteroonni ijaarsaa, dagaagina digadeef qooda ijoo taphatan keessaa isa tokko ta'us, naannoo faaluu keessattis gahee guddaa qaba. Akka addunyaatti, sekteroonni ijaarsaa kara nam-tolcheen CO₂ gadhiisuun hannisaa, geejjiba, industiriifi ciraamu bosonaa hordofuun sadarkaa shanaffaa qabata. Akka addunyaatti hannisaa %40 tajaajilamuun CO₂ %33 gar qilleensaatti gadhiisa. Kanaaf qooda guddaa kan taphatu adeemsa oomisha simmintoo (Portland cement) ta'ee, innis bugugii toonii tokko gadhiisu keessaa CO₂ naannoo 0.9 gadhiisuufi waggaatti CO₂ naannoo toonii

biiliyona 2.8 gadhiisuun, faalama addunyaa %5-8 qooda qaba. Simmintoon ijaarsaaf humna guddaa kan kennu ta'us, naannoo keessatti kan itti fufinsa qabu miti. Kanaafuu, waantota naannoo keessatti argaman irraa filannoowwan kaarboonii xiqqaa kan qabu, bu'uura polymer kan qabu oomishuun barbaachisaadha. Argannoowwan akkanaa qormaata mana jireenyaa baadiyyaa Itoophiyaa furuuf, sadarkaa jireenyaa hawaasa baadiyyaa %80 fooyyessuufi tattaaffii tarkaanfii haala qilleensaa addunyaatiif gumaacha hiika qabu gochuuf murteessaadha.

Malaafi Argannoo

Qorannoon kun gahumsa biyyee lamaa madaaleera: biyyee Baatee (Haramaya) fi biyyee Guguba geopolymerization akka dursitoota jalqabaatti, daaraa jimaafi daaraa xuuxxoo agadaa galtee ta'eera. Galteewwan mana sadarkaa eeggateefi meeshaaleen, xiinxalli qaamaa, keemikaalaafi mineralogical taasifameera. Akka si'eessituu alkaline-tti Sodium Hydroxide (NaOH) fi Sodium Silicate (Na₂SiO₃) walitti makamuun hojiirra oolani. Xuubiin biyyee (GPCEB) Geo-polymer-n cafaqamee taa'e jabina isaa ilaaluuf haalota ittiin jabeessan gara garaan madaalameera: oven-curing (80°C saatii 48 + guyyoota 14 ho'a kutaa keessaan) fi ambient-curing (25.5°C ± 2 guyyoota 60f). Madaalliin jabina compressive saamuda hunda irratti kan fudhatameefi ga'umsaafi mijaa'ummaa filannoowwan michoota naannoo kanneenii

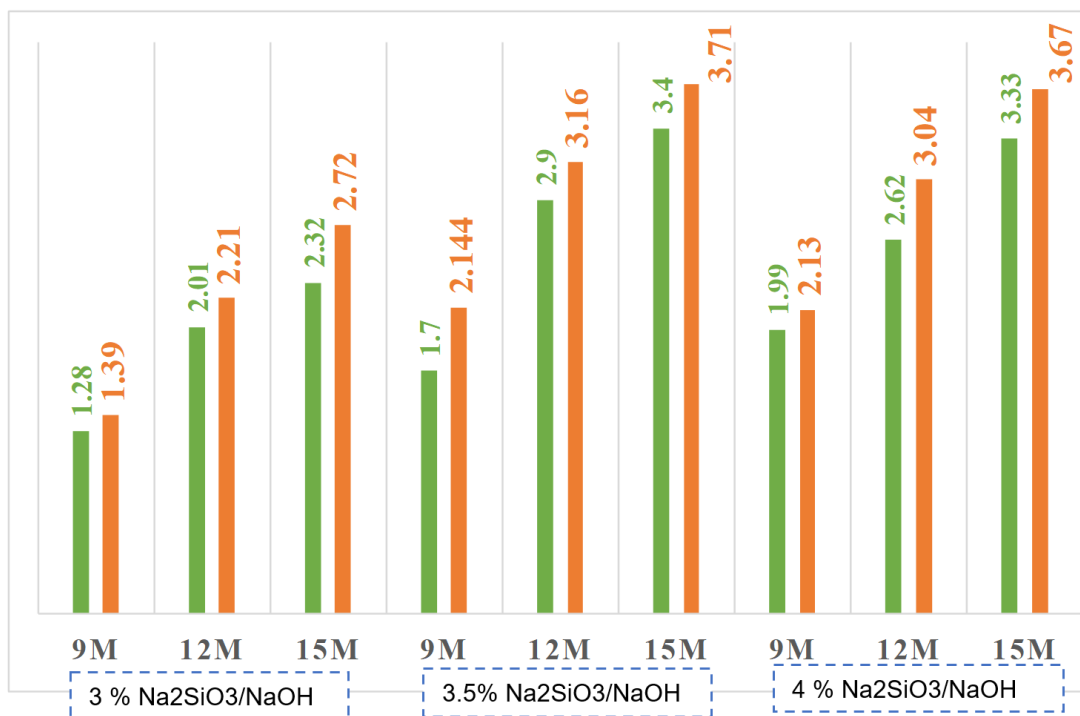
madaaluuf, argannoowwan Simeentii Poorlaandiiin tasgabbeeffame (Portland-cement-stabilized compressed earth blocks (CSCEBs)) waliin wal bira qabamaniiru.

Biyyoon Baatee silica-alumina-n badhaadhaa, biyyeen Guguba ammoo silica-n gadu bu'aadha. Biyyeen Baatee oksaayidoota barbaachisoo (SiO_2 , Al_2O_3 , Fe_2O_3) kan keemistirii si'ataa simmintoo tajaajila kennuun wal isa fakkeessan of keessaa qaba. Daaraan jimaa Lime-n (CaO) olaanaa ta'ee, akka tasgabbeessaa (stabilizer) uumamaatti fadhatame.

GPCEBn Baatee bu'uureffate, 15 M NaOH, a 3.5 $\text{Na}_2\text{SiO}_3/\text{NaOH}$ ratio, fi 17.20% alkaline solution waliin cimina gaarii 4.88 MPa (olaanaa) fi 4.00 MPa (giddugaleessa) guyyoota 14 oven curing booda argate.

Adeesa ambient curing jalatti, guyyoota 60 keessatti 3.71 MPa (olaanaa) fi 3.40 MPa (giddugaleessa) ta'uun qindaa'ina wal fakkaataati argame. Kunis jabina xuubiwwan aadaa harkaan tolfaman kan caalu ta'ee, ulaagaa fe'isaa kan guutudha. Akka qorannoon agarsiisutti, ambient curing (qilleensa qoorsuu) mana jireenyaa abbaa darbii tokkoof jabina gahaa kan qabu yoo ta'u, kunis fedha industuroota annisaa fayyadamanii dhabamsiisa.

Saamuda Baatee-Guguba walitti makuun guyyoota 14tti 4.2 MPa (olaan.) fi 3.50 MPa (gidg.) galmaa'e. GPCEBn Gurguba irratti hundaa'e silica xiqqaa waan qabuuf jabina ulaagaa hinguunne (0.91 MPa) bu'aa gadaanaa fide, kunis ga'umsa ulaagaa fe'isaa guutuuf biyyee filachuu ykn walitti makuun murteessaa akka ta'e mul'isa.



Fakii 1: Saamuda biyyee Baatee jabina cafaqaa Olaanaa (Max.) fi Giggu galeessa (Av.) hannisaa ambient curing guyyoota 60.

Akka qorannoon mul'isutti, biyyeen Baatee amaloota keemikaalaafi fiizikaalaa inni of keessaa qabu geopolymer hojjechuuf barbaachisuufi jabina sadarkaa isaa eeggateefi ulaagaa feinsaa kanguutu GPCEB walitti fufinsaan oomishuuf dandeessisa. Qabiyyeen silica fi alumina olaanaa ta'uu, wal harkisuun gadaanaafi amala laastikaa dhabuun hidhata geopolymer jabaaf qooda ba'a, kunis yoroo olka'insi qoodinsa si'atoo jabina cafaqaa annisaa oven fi ambient curing lamaan jala jiran qabatamaan fooyyessudha. Faallaa kanaan, biyyeen Guguba silica xiqqaa waan of keessaa qabuuf wal nyaatinsi isaa daanga'aadha, kanaafuu biyyee Baateen makamu malee ga'umsi isaa gadi bu'aadha. Ga'umsi jabina xuubii Baatee GPCEB filatamaa xuubii simmintoo irraa tolfame waliin wal dorgoma, kanaanis ijaarsa itti fufiinsa qabu baasii xiqqaadhaan filannoo geopolymer fudhachuun danda'amu isaa agarsiisa. Biyyeen Baatee waan naannoo keessaa argamuufi geopolymer cafaqaa xuubii lafaaf baay'ee mijatu, meeshaalee simintoo irratti hundaa'aniif kaarboonii xiqqaafi caasaa amanamaan filannoo ta'ee dhiyaate.

Policy Recommendations

- Ministeerri Magaalaafi Bu'uraalee meeshaalee itti fufiinsa qabaniifi geopolymer irraa tolfaman qajeelfama ijaarsa biyyaalessaatti madaqsuufi faayidaa isaan pirojektoota ijaarsa manaa gatii madaalawaa keessatti qaban jajjabeessuu qaba.
- Mootummaan naannoo pirojektoota mana jireenyaa GPCEB fayyadamuun ga'umsa isaa agarsiisuufi naannootti madaqsuu jajjabeessuuf deeggaruu qabu.
- Ministeerri Magaalaafi Bu'uraalee, akkasumas qaamoleen dhimmi isaa ilaallatu guddina meeshaalee ijaarsaa naannoo waliin michooman ol kaasan irratti interpiraayizoota xixiqqaafi giddu galeessaafi oomishtoota naannoof leenjii ogummaafi deeggarsa taasisuu qabu.



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IV

Ogafaanota Hojiifi Marsaa Jireenyaa Hidhata Hawaasaafi Guddina Naannoof Akka Harargee Bahaatti

Abarraa Admaasuu¹, Jeylaan Woliyee¹, Mohaammad Hasan¹, fi Mohaammad Abdoo¹

¹Kolleejjii Saayinsii Hawaasummaa fi Saayinsii Namoomaa, Yuunivarsiitii Haramaayaa, Itiyoophiyaa,

Ergaawwan Ijoo

- Sirboonni hojiifi Mirriysni meeshaa hawaasaa bu'a-qabeessa hojii kan qindeessu, qusannaafi aadaa midhaan sassaabbiin boodaa dabarsu, quuqama dabarfachuuf waltajjii walabaafi safuu gorsudha.
- Goorowwan gaa'elaafi galataa dargaggootaafi shamarran gara itti gaafatamummaafi wal kabaja, yeroo ce'umsa marsaa jireenyaa gorsa aadaa kennuun madaqsa.
- Hindikkoon shammarranii sagaleefi deeggarsa eegu; raawwii isaanii waliin kanneen dhabamsiisuun beekumsaafi deeggarsa xiinqalbii hawaasaa dhabamsiisa.

Seensa

Afrikaa keessatti ogafaanonni akka qaama giddu galeessaatti beekumsa hawaasaa dabarsuu, sonoota hawaasaa kakaasuufi jireenya waliinii tursiisuun seenaa tajaajila dheeraa qabu. Oromoo Hararge Bahaa keessatti, duudhaaleen kun addatti cichanii kan turan, tajaajila bohaarsummaa qofaan utuu hintaane amala kan qajeelchan, wal deeggaruu kan cimsaniifi yaadannoo waloo eeguu dabalateeti malee. Goorowwan akka mirriysaa, darashaa, shobdo, hindikkoo, shaggooyyee, heellee/heellemaa fi sirboonni galataa hedduun aadaa kara hawaasni hojii itti qindeesu, dargaggoo itti leenjisu, abdii/hawwii itti ibsuufi miiraafi ibsa hawaasummaa itti to'atudha.

Yeroo ammaa, magaalummaan wal qabatee jijjiiramni hariifataa hawaas-dinagdeefi jijjiiramni aadaa mul'atu, waliin hojjechuun hanqisuu, dhiibbaa miidiyaa babal'ateefi ilaalchi amantaafi bulchiinsaa jijjiiramuu hunkaaleen ogafaanii aadaan akka ba'anii hinmul'anne bakka dhowwotani. Akkuma dhiibbaaleen kun dabalaniin, lufinsi dhaloota gidduu nilaaffachuufi keessattuu gooroo dubartoonni ittiin ibsatan nidhabama. Goorowwan kana manneen barnootaa, wiirtuu dargaggoo, bakka hawaasni itti wal ga'uufi miidiyaalee naannoo keessatti akka hojiirra oolu gochuun akka Harage Bahaatti baasii xiqqaan, tooftaa hidhata hawaasaa aadaa irratti hundaa'e deebisee ijaaruu, kaka'umsoota guddinaa gabbisuufi hambaa lubbu qabeessa dandamannaa hawaasaa dabarsaa ture kunuunsuu affeera.

Malaafi Argannoo

Qorannoon kun mala sanyaabsaa hunkaa dheeraa keessatti afgaaffii hiikkaa, marii garee xiyyeeffannoofi hirmaachaa daawwachuu aanaalee Harage Bahaa hedduu keessatti taasifameera. Hafeewwan afaaniffaa funaanamaniiru, gara barreeffamaatti jijjiiramaniiru, akkasumas xiinxalli ethnopoeitic fi daangaalee hiikkaa, qorattoonni hurrubbi, qabiyyee fi galumsa hawaasaa akka walitti fidan kan eeyyamuun gaggeeffame.

Qorannoo kanaan akkaataa ogafaanonni jireenya guyya guyyaa keesstti itti tajaajilan, jijjiirama mudatanitti haala itti madaqaniifi haala hawaasni dhimmoota hawaasummaa, dinagdeefi dhiibbaawwan hamlee itti keessummeessan hunda keessaa ragaaleen akka maddaniif maanguddoonni, dubartoonni, dargaggoo/shamarran, ooggantoota amantaa, waloowwanfi kanneen aadaa gaggeessan hirmaataniiru.

Mirriysaa waltajjii qeeqa lammummaa, yaadannoofi naamusaati. Kan hawaasakeessatti hurrubfamu ta'ee xiyyeeffannoof, guurii gurraa fudhadhu jechuun eegalama; haqa dabe, geggeessummaa hanqatteefi waan waliin isaan mudate ittiin dabarfama. Buufanni isaa eelaa akka Calanqoo yaadachuun, hanqina mootummaa ammaa keessa jiru faana walitti fiduun yoo xumuran affeeranii keessaa ba'u.

*Dhagahii dhaggeeffadhuu... guurii gurraa fudhadhuu
Yaaboo lola gaafa Calanqoo himadhu moo nin dhiisaa?*

Ergaa: Eelaa ittiin yaadachuun qalbeeffannaa waan ta'aa jiruufi itti gaafatamummaa waliinii barsiisuudha; waltajjii barnoota lammummaaf waamichaafi owwaannaa huubaatii hinqabnedha. Caasaan marii kun hawaasa walddhabdee malee itti gaafatamummaafi gara laafina leenjisa.

Sirboonni aadaa yeroo hojii humna namaa kan walitti qindeessaniifi oomishtummaa, qusannaafi michummaa uumu.

Darashaa yeroo **guuzaa** (hawaasni walitti dhufuun dabareen kan wal gargaaru) humna namaa kan walitti qindeessu, hojiitti honnachiisuufi safuu dabarsuu: akkasumas qisaasa dhabamsiisuu, yeroo to'achuu, midhaan kunuunsuu, hojjettoota qixa ilaaluufi carraaqqii ajaa'ibsiifachuuf oola.

Shobdoon saffisaafi hamilee eeguuf yeroo gufannaan uumamu yeedaloo amala dibbee qabu ida'ata; bara abbaa lafaa keessa saamicha irratti mormii ture yaadachiisa. Sirboonni kun waantota suuta tasgabbeessan ta'anii tajaajiluu, adeemsa hojiifi waantota eegaman qajeelchu.

Fakkeenya: *Darashaa* — kunuunsa sassaabbii boodaafi qusannaa

Haati dhiiraa ni beeytii; firii buute ni fuutii

Ergaa: Safuu qisaasama irratti; sassaabbii of eeggannoodhaan qabachuudhaan wabii nyaataa maatii jajjabeessa.

Fakkeenya: (Shobdo — honnachiisuufi mormii dhokataa):

Haromaayaan leenci bulee; ohoo hayee... Barre laashaa akka sootii...

Ergaa: Bulchiinsa haqummaa hinqabne humna namaa keessatti qancare qeeqaa bakka hojiitti sirba itti fufu.

Hindikoo sagalee dubartootaadha; kun dhabamuun tumsa xiinqalbii hawaasummaa laaffisa.

Hindikoo yeroo midhaan tuman/daakan hojiirra oola, himannaadha, ba'aa isaanii afuura ittiin baafatu, kan hiriyyoonni ittiin wal gorsaniifi daangaa hariiroo ittiin eeggatanidha. Baaburri midhaan daaku baay'achuufi galgala dirreen midhaan daakuu baduun, dubartoonni waltajjii hurrubbii guyya guyyaa dhabuun deeggarsa hawaasummaafi beekumsa dinagdee mana keessaa walii qooduu hir'is.

Sihi, mooyyeen maal si seete... Haftuu ulfoofte si seete...

Ergaa: carraaqqii itti fufsiisuufi amala miidhaa qabu qeequun kara sirbaa qajeelfama hiriyyaa waliif dabarsu.

Goorowwan gaa'elaafi dargaggoo/shamarranii hawaasa walitti fidu, nigorsuufi ce'umsa nikabaju.

Shaggooyyee dargaggummaa, filannoofi tapha irratti xiyyeeffata; heellee/heellemaa misirroo ittiin gorfama, waliin dubbii jajjabeessa, of qabuufi heeraafi kaadhimaa ofiif kabaja qabaachuu. Sababa babal'ina miidiyaa ammayyaa, ilaalch jibbinsaa sirnoota darbaniifi fedha dhabuun kunneen hanqisuun, barnoota ga'eessotaa gama aadaan darbu dhabuudha.

Fakkeenya: Shaggooyyee — kabajaafi hawwii

Urjiin samii tanaa lakkoofsattuu kumaa... Eessaa asiin baatee takkiittii akka kumaa...

Ergaa: Madaalliifi filannoo sirrii; wal hubannaafi kabaja dargaggoota gidduutti ijaara.

Fakkeenya: Heellee — gorsa misirroo

Ayiyaan amba arrabde jette bafte sihimtii gargari galla...

Ergaa: Of eeggannoofi hariiroo kabajaa qabatamoo mana keessaa; naamusa gaa'ela keessatti. Goorowwan faaruu galataa eenyummaa hojii qonnaafi barnoota hamilee jajjabeessa. Urursaan daa'ima haadholiin yaaddoo ibsuufi aangoo mana keessaa dubbatu; faaruu horiin kunuunsaa horii jajjabeessuufi dinagdee maattii ittiin galateeffatu. Goorowwan kun hormaanni, jaalalliifi walitti hidhanni nama, lafaafi horii gidduu akka jiru mul'isu.

Yaada Imaammataa

- Ministeerri Barnootaafi Biiron Barnootaa Oromiyaa walaloo xabboo akka mirriysaa, darashaa/shobdo, hindikkoo, shaggooyyeefi heellee kilebiwwan, sagantaalee sirna barnootaa dabalataafi sagataa aartii/ogbarruu mana barumsaatti fiduun carraa bifa qindaa'aan qabiyyeewwan aadaa barsiisuu uumuu qabu.
- Ministeerri Dhumma Dubartootaafi Hawaasummaa dirree dubartootaa walaba ta'e kan akka hindikkoo achumaan sagantaalee dhaloota dhufee darbuu jajjabeessaa ogafaanota dubartootaa tursiisuufi bakka bu'ummaa aadaa isaan qaban kan jajjabeessu maallaqaan tumsuufi haala mijeessuufii qabu.
- Ministeerri Aadaafi Ispoortiifi Biiroo Aadaafi Tuuriizimii Oromiyaa eegumsa IP sirriin goorowwan hawaasaa galmeessuufi haddaarsuu, sirna guuzaafi jiloota sassaabbaan boodaa akka hinbadne waltajjii aadaa qopheessuufi sagantaa raadiyoo ogafaan irratti xiyyeeffatanii tamsa'an ogeessa waliin dhiheessuu qabu.
- Ooggansi aanaafi gandaa taatewwan aadaa hawaasaa tumsuu, raawwii hidikkoof dirree uumuufi maanguddoota waliin ta'uun galmee aadaa sakkoo eeggate mirkaneessuu qabu.
- Yuunivarsiitiwwan ogafaanota walitti qabuufi barsiisotaafi hojjetoota aadaa kunuusa hambaa irra jiraniif leenjii kennuu qabu.



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IV

Sirna Barnootaa Aad-Danuu Hojiirra Oolchhu irratti Qaawwa Jiru: Ragaa Yuunivarsiitiilee Mootummaa Baha Itiyoophiyaatiin

Dabalaa Tazarraa¹, Yilfashawaa Siyuum¹, Daawit Nagaassaa¹, fi Gaarkeeboo Baashaa¹

¹Koleejii Barnoota fi Saayinsii Haala Hojii, Yuunivarsiitii Haramaayaa, Itiyoophiyaa

Ergaawwan Ijoo

- Yuunivarsiitiilee baha Itiyoophiyaa keessatti hojiirra oolmaan sirna barnootaa aad-danee guutummaan gadi bu'aadha, innis daree keessatti aad-danee hirmaachisuun kallattii hedduun raawwii gadi bu'aa calaqqisiisa.
- Barsiiftoonni sirna barnootaa aad-danee hojiirra oolchuuf kutannoo gadi aanaa kan agarsiisaniifi raawwii sirna barnootaa aad-danee hiika qabu deeggaruufis kutannoon isaanii gahaa miti.
- Gufuuwwan jiran hubannoo gadi aanaa, qajeelfamaafi meeshaalee deeggarsa barnootaa, hanqina ogeeyyii barnoota aad-daneefi xiyyeeffannoo hoggansa laafaa ta'uu kan dabalatu yoo ta'u, hundinuu yunivarsiitiwwan mootummaa keessatti garaagarummaafi gochaalee sirna barnootaa hunda hammate guddisuu gufachiisanidha.

Seensa

Dhaabbileen Barnoota Olaanuu (DhBO) akka addunyaatti jiran garaa garummaa aadaa, afaanii, sabaafi ilaalacha addunyaa babal'isuun hirmaannaa guddaa akka taasisanti irraa eegama. Haala kanaan, barnoonni aad-danee (BAD) galumsa barnootaa gara garaa keessatti wal qixxeessummaa (equity), wal danda'uu, waliin jiraachuu, walitti hidhannaa hawaasaa

guddisuuf mala murteessaa ta'ee kan mul'atedha. Barnoonni bu'uuraan meeshaa jijjiirama hawaasaa yoo ta'u, sirni barnootaa barsiisuu, barachuu, madaalliifi haala ilaalcha, dandeettii fi eenyummaa barattootaa bocuun qajeelchee hawaasa fakkeessuun giddu-galeessa adeemsa kanaa ta'ee kan argamuufi "honnee barnootaa" ta'ee hojjeta. Adeemsa tooftaaleen barnootaa addunyaa rakkoolee danummaan wal qabatan furuuf yaalan keessatti, BAD yaaxxinaafi raawwiin itti fufinsaan irra deddeebi'ee yaad-rimaa'uufi mirga namaa, haqa hawaasummaafi ga'umsaan sirna barnootaa hawaasa aad-danee keessatti hojiirra oolchuuf dhimma irratti falmamu ta'ee itti fufeera.

Itiyoophiyaan saba danummaa aadaa, afaaniifi sabootaan kan ibsamtu ta'ee, barbaachisummaa haaromsa sirna barnootaa sab-danuu ega hubattee tureera. Roodmaappii Barnootaa (2018) fi Tarsiimoo Barnoota Olaanoo dabalatee, imaammattoonni biyyoolessaa ammaa, tokkummaa garaa garummaa keessatti, carraa walqixa, haqummaa, barbaachisummaafi qulqullina cimsu. Itti gaafatamummaan kunneen jiraatanis, yeroo ammaa yunivarsiitiwwan mootummaa ltoophiyaa wal dhabdee sabaa, garaa garummaa siyaasaafi hanqina sirna barnootaafi raawwilee daree bal'isuu irra deddeebiin mudatanidha.

Itti fufinsaan hojiileen qorannoo akka mul'isanitti, hammataa ta'uu dhabuu sirna barnootaa, sagantaaleen aad-danee xiqqaachuufi deebiin deeggarsa barnootaa gadi bu'aa ta'uun, barsiiftonni hubannoo, ogummaafi qophii barsiisummaa irratti hanqina akka qabanidha. Dhiibbaaleen kunneen kutannoo barsiisaa madaaluu, danqaawwan caasaa adda baasuufi haaldureewwan sirna barnootaa sab-daneessaa yuunivarsiitiwwan Itiyoophiyaa keessatti hojiirra oolchuun ariifachiisaa ta'uu agarsiisa.

Malaafi Argannoo

Qorannoon kun saxaxa sakatta'a addeessaa

qaxxaamuraan funaansa ragaa ammamtaa irratti xiyyeeffachuun bargaaffii to'annoo dhuunfaan barsiisota 151 yoonivarsiitiilee mootummaa Baha Itiyoophiyaa irraa funaaname. Hirmaannaa bakka bu'insaa mirkaneessuuf hojimaata iddattoo tartiibaafi filannoo tasaa salphaati tajaajilani. Amanamummaan malleenii qorannoo yaalii hordofuun Cronbach's alpha tajaajilamuun sakatta'ame. Xiinxalli odeeffannoo haala hojiirra oolmaa sirna barnootaa aad-danee, kutannoo barsiisotaafi garaa garummaa koorniyaa akka ta'e qorachuuf istaatiksii ibsituu (mean, SD) fi tooftaalee yaada xumuraa t-tests fi one-way ANOVA dabalatee fayyadameera.

Gabatee 1: Sadarkaa hojiirra oolmaa aad-danummaa yuunivarsiitiwwan mootummaa baha Itiyoophiyaa.

Agarsiiftuu Rawwii	N	Mean (M)	SD	Hiikkaa
To'annaa gufuuwwan daree aad-danee	151	2.94	1.034	Giddugaleessa
Barsiisuun garaa garummaa barataatti kan madaqe	151	3.11	1.006	Giddugaleessa
Garaa garummaa aadaaf akka wal danda'an taasisuu	151	2.92	0.97	Gadaanaa
Wal qoqqooddii sabaa hir'isuu	151	3.2	1.02	Giddugaleessa
Garaa garummaa eenyummaa ibsuu jajjabeessuu	151	3.92	1.03	Giddugaleessa
Garaa garummaa calaqqisiisuuf tapha tajaajilamuu	151	3.06	1.02	Giddugaleessa
Dhimmoota addunyaa sirna barnootaatti makuu	151	2.22	1.091	Gadaanaa
Sagantaalee aad-danuu qopheessuu	151	3.03	0.99	Giddugaleessa
Mala barsiisuu aadaa giddu galeeffate tajaajilamuu	151	2.12	1.06	Gadaanaa
Wal danda'insaaf hojii garee uumuu	151	3.18	1.02	Giddugaleessa

Bu'aa qorannoo kanaan, sadarkaan hojiirra oolmaa sirna barnootaa aad-danee yuunivarsiitiilee mootummaa baha Itiyoophiyaa akka waliigalaatti gadaanaa, calaqqeewwan hunda keessatti $M = 2.097/5$, $SD = 1.09$, raawwilee daree keessatti taatewwan sab-danuu tajaajilamuun ga'aa akka hintaaneti mul'ate. Wantoonni ga'umsoota murteessoo madaalan kanneen akka gufuuwwan to'annoo daree aad-danee, garaa garummaa aadaaf wal danda'uu uumuu, dhimmoota addunyaa qabiyyee barnootaatti makuufi adeemsa baruuf barsiisuu aadaaf deebii kennan kan mean gadaanaa galmeessan hojiirra oolchuu, kunis gochoonni aad-danee barbaachisoo ta'an kun barsiisotaafi hoggansa yunivarsiitii irraa

xiyyeeffannoo daangeffame akka argatan agarsiisa. Faallaa kanaan, raawwilee akka barnoota garaa garummaa barattootaatti madaqsuu, wal qoqqooduu sabaa hir'isuu, garaagarummaa calaqqisiisuuf tapha fayyadamuu, sagantaalee aad-danuu qopheessuufi akka dhaabbataatti jabaatee mul'achuu baatus, hojiirra oolmaa wal danda'uu hanga ta'e jiruuf hojii garee jajjabeessuu. Adeemsa kanarraa, waantonni aad-danummaa calaqqisiisan muraasni jiraatanis itti fufinsa, jabinaafi yuunivarsiisota hunda keessatti adeemsa hojiirra oolmaa akka hinqabneti mul'ata.

Hirmaannaa barsiisotaan wal qabatee, kutannoon sirna barnootaa aad-danuu hojiirra oolchuuf qaban gadi gu'aa ta'uu bu'aan qorannoo mul'isa. Qabxiin waliigalaa mean ($M = 23.81$) kan midpoint ($M = 24$) tti dhihoo ta'us, bu'aan t-test akka mul'isutti barsiisonni hojiirra oolmaa sirriif kutannoon qaban quubsaa akka hintaanedha. Sadarkaa yaaxxinaatti barsiiftonni barnoota aad-danuu hojiirra oolchuu kan deeggaran ta'us, hedduun isaanii ogummaa, qophii sirna barsiisuu, beekumsa qabiyyee fi yaadrimee aad-danuu ga'umsaan barnoota isaaniitti makuuf kaka'umsa barbaadamu hinqabani. Deeggaruufi hojiirra oolchuu gidduutti qaawwi uumame kun guddina ogummaafi deeggarsa dhaabbilee irratti kan xiyyeeffate akka barbaachise agarsiisa.

Qorannoon kun dabalataan dhimmoota hawaasummaa, keessattuu koorniyaan hojiirra oolmaa sirna barnootaa aad-danuu irraan dhiibbaa uumuun sakatta'ameera. Sadarkaa hojiirra oolchuu barsiisota dhiiraafi shamarranii ($F(22,128)=0.879$, $p=.621$) garaa garummaan lakkoofsaa akka hinjirre ANOVA kar-tokkee mul'isa. Kun ammoo gareen lamaanuu danqaafi qormaata wal fakkaataa akka isaan mudate agarsiisa. Danqaaleen hojiirra oolmaa irratti dhiibbaa geessisan koorniyaan kan wal qabatan osoo hintaane dhimmoota sirnaa bal'aa dhaabbilee hunda keessatti mul'atan irraa kan maddan ta'uu argannoon kun mul'isa. Argannoowwan ammantaan cinatti, qorannoon kun gufuulee gurguddoo hojiirra oolmaa sirna barnootaa aad-danuu bu'a qabeessa ta'e gufachiisan ijoo ta'an hedduu adda baaseera. Isaanis sagantaaleefi koorsiilee aad-danuun gahaa ta'uu dhabuu, hubannoo murtaa'aa, hojiilee aad-danuu kan jajjabeessu xiqqaachuu, hanqina ogeeyyii barnoota aad-danuufi hanqina meeshaalee barnootaa barbaachisoo ta'an fa'i. Kutannoo hoggansaas laafaa ta'uun kan argame yoo ta'u, bulchitoonni yunivarsiitii barmaatilee aadaa hedduu cimsuuf xiyyeeffannoo gahaa hin kennine. Warren siyaasa aad-danuu, sodaa qoqqoodinsa sabaafi hiika dogoggoraa federaalizimii sabaa wajjin wal qabsiisuun, tattaaffii sirna barnootaa adda addummaa mirkaneessan jalqabsiisuuf taasisamu daran walxaxaa taasise. Dhiibbaaleen sadarkaa dhaabbataafi haalotaa walitti qabaan maalummaa caasaa rakkoo kanaa kan agarsiisuufi giddu-seensi qindaa'aahattamaan akka barbaachisu mul'isa.

Yaada Imaammataa

- Dhaabbileen Barnootaa Olaanoo lammiilee garaagarummaa aadaa dirree barnootaafi barnoota mit-idilee keessatti beeksaniifi guddina biyyaafi addunyaaf gumaachuuf ga'umsa qaban oomishuuf itti gaafatamummaa akka qaban hubachuu qabu.
- Ministeerri Barnootaa sirna barnootaafi tarsiimolee dhaabbilee olaano qindeessuu, qopheessuufi madaaluu, leenjiifi deeggarsoota barbaachisoo dhimmoonni aad-danuufi garaagarummaa guutummaan hojiirra ooluu mirkaneessan kennuu irratti xiyyeeffannoo jabaa taasisuu qaba.
- Ministeerri Barnootaa dizaayinii sagantaa aad-danuu fooyyessuufi meeshaalee barnootaa aadaan wal qabatan dhiyeessuuf dursa kennuu qaba; qophii sagantaa qajeelchuuf bu'uuraaleen barnoota aad-danuu biyyoolessaa diriiruu qabu, akkasumas yunivarsiitiwwan hojiirra oolmaa barnoota aad-danuu bu'a qabeessa ta'eef qabeenya waliif qooduu tumsuu qabu.
- Ministeerri Barnootaa, oogghansa yunivarsiitii waliin ta'uun, dhaabbilee barnoota olaano keessatti gatiifi barbaachisummaa barnoota aad-danuu beeksisuuf qajeelfama qindaa'aa oogghansaalee barnootaa, barsiiftota, barattootaafi kanneen dhimmi ilaallatuuf qopheessuu qaba.
- Ministeerri aadaafi Ispoortii, aad-danummaa manneen barnootaafi naannowwan barnootaan alla keessatti guddisuuf carraaqqii qaamota gara garaa walitti qindeessuu, qajeelfama kennuufi deeggarsa meeshaaleefi maallaqaa taasisuu qaba.



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V

Tuuta Raawwilee Mala Qonnaa Qindaa'aan Nageenyaafi Dandamannaa Mirkaneessuu: Hubannoo Harargee Bahaa, Itiyoophiyaa

Jaafaar Muummee Ahmad¹, Jamaa Hajjii², Mootii Jaalataa³, fi Kadir Jamaal²

¹Giddugala Guddinaa Afrikaa Qonna Haala Qilleensaa Waliin Walsimsiisee fi Eegumsa Hedduumina Uumamaa, Yuunivarsiitii Haramaayaa, Itoophiyaa;

²Mana Barnoota Dinagdee Qonnaa fi Daldala Qonnaa, Yuunivarsiitii Haramaayaa, Itoophiyaa;

³Giddugala Fooyya'insa Qamadii fi Garbuu Addunyaa, Finfinnee, Itoophiyaa.

Ergaawwan Ijoo

- Maatileen Raawwilee Mala Qonnaa Qindaa'aa kanneen akka kunuunsa qonnaa (conservation agriculture), to'annaa gabbina biyyeefi gosa midhaanii baay'isuu madaqsan baasii fayyadamaan (consumption expenditure) kanneen hinmadaqsine naannoo %73n caalu.
- To'annoo Gabbina Biyyee hojiiarra oolchuun gosa soorataa %43.7n fooyyessuufi dikee xaa'oon makanii tajaajilamuun galii woggaa abbaa warraa Birrii 41,938titti guddisa.
- Barnoota, deeggarsa ekisteenshinii, abbummaan beeyladaafi odeeffannoo haala qilleensaa argachuun hojii madaqsuuf sababayoo ta'an, fageenyi gabaa rakkoo jabaa ta'ee kan jirudha.

Seensa

Jijjiiramni qilleensaa oomishtummaa qonnaa addunyaa irratti dhiibbaa guddaa kan qabuufi qormaata murteessaa sirna nyaataa addunyaa irratti mul'atu keessaa tokko bakka bu'a. Dhiibbaalee haala qilleensaa kan akka hongee oomisha midhaaniifi galii abbootii warraa hir'isuun, gara rakkoo nyaataafi nageenya (welfare) dhabuutti geessa. Biyyoonni Afrikaa Sahaaraa gadii haala qilleensaa hamaaf baay'ee saaxilamuufi qonna roobaa irratti qofa hundaa'uu irraa kan ka'e, oomisha qonnaan

sadarkaa giddu-galeessaa akka addunyaatti taa'ee gadi ta'uun itti fufani.

Dhiibbaaleen haala qilleensaa, aadaa yeroo dheeroof roobuu dhiisuun, irra deddeebi'uufi Itiyoophiyaatti hammaataa ta'aa dhufe. Kunis wabii nyaataa hammeessuu, bishaan argachuu hir'isuufi akkasumas oomisha qonnaa barbadeessuun, rawwilee qonnaa aadaa irratti daran hammaate. Kanarraa kan ka'e, baasiin fayyadamuu abbaa warraa baay'inaan haala roobaa irratti waan hundaa'uuf, tooftaaleen madaqsuu hatattamaan akka barbaachisu hubachiisa. Namoota miil. 7.5 Oromiyaa keessaa dabalatee, hongeen irra deddeebi'ee biyyattii keessatti mudatu miiliyoonita hubeera. Naannowwan Harargee Bahaa hongeeff saaxilaman, rakkoon jiidhinsa biyyee irra deddeebi'uun dandamannaa abbootii worraa gadi buusuufi kiyyoo hiyyummaa gadi fageesse.

Raawwilee Mala Qonnaa Qindaa'aa (RMQQ) kan akka kunuunsa qonnaa, to'annoo gabbina biyyee qindaa'aafi gosa midhaanii baay'isuun dandamannaa fooyyessuu, oomishtummaa dabaluufi hiyyummaa hir'isuuf daandii abdachiisoo ta'anii dhihaatanidha.

Ragaaleen akka agarsiisanitti, CSAP madaqsuun balaa haala qilleensaa furuun fayyadama nyaataa, gosa soorataafi galii maatii fooyyessa. Haata'utii, Itoophiyaa keessatti, keessumaa naannoowwan hongeef saaxilaman kan akka Harargee Bahaa keessatti muuxannoon madaqsuu gadi aanaadha. Qorannoon kun gaaffilee ijoo lama deebisa: (1) Qonnaan bultoonni RMQQ akka madaqsan dhiibbaa kan geessisan maali? (2) RMQQ madaqsuun haala gogiinsa keessatti nageenya maatii ni fooyyessaa? Mala-dhahi ijoo, RMQQ madaqsuun manca'insa haala qilleensaan wal qabatee mudatu hir'isuun baasii fayyadama abbaa warraa nidabala kan jedhudha.

Malaafi Argannoo

Qorannoon kun godina Harge Bahaa, aanaa Gooroo Guutuu, Gursum, Baabbileefi Qarsaatti gaggeeffame. Ragaan kan funaaname abbootii warraa qonnaan bulaa 430 adeemsa qo'annoon (survey) ta'ee, hongeen dabalaa deemuu mirkaneeffachuuf galmee roobaa waggoota 30n tumsame. Raawwileen sakatta'aman kan ilaallatan Kunuunsa Qonnaa, kan midhaan wal keessa facaasuu, jijijjiiranii facaasuufi huwwisuu (mulching) of keessaa qabu; To'annoo Gabbina Biyyee Qindaa, kan itti fayyadama dikee, xaa'oofi lolaa ittisuu kan hammateefi gosa midhaanii baay'isuu, kanneen gatii olaanaa qabanfi/ykn midhaan hongee dandamatan taasisuu fa'i. Nageenya abbootii warraa kan madaalaman baasii fayyadamaa gita ga'eessa tokkoon, gosa soorataafi galii qonnaa tajaajilamuuni. Hiyyummaan kan madaalame daangaa hiyyummaa Itiyoophiyaan keesseen ta'ee, dandamannaan ammoo galmee ragaa makaa (composite score) kan yeroo hungeen mudatutti dandeettii madaqsuu danda'uu abbootii warraa mul'isuun madaalame. Qabxiin dandamannaa haala qonnaan bultoonni yeroo hongee itti dabarsan hubachuuf qophaa'e. Moodeloonni econometric gara garaa murteessitootaafi dhiibbaalee RMQQ madaqsuu madaaluuf hojiirra oolaniiru.

Galmeen roobaafi jechi qonnaan bultootaa gogiinsi kan irra deddeebi'uufi cimaa ta'uu dhugoomsa, kunis naannoo qorannichaa keessatti dhiibbaan qilleensaa guddachaa dhufuu mul'isa. Madaqsi mala qindaa'aa barnoota, tajaajila eksteenshinii, odeeffannoo haala qilleensaa wayitaawaasi abbummaan beeyladaan hedduu wal qabata, bakki gabaa fagaachuufi hanqinni galteewwanii rakkoo hammaatoo ta'anii itti fufaniiru. Kunuunsi qonnaa fayyadama waggaa %36.3n yoo dabaluu, mala danuu walitti fiduun gara %73.3tti guddisuun hiyyummaa qabatamaan gadi buusa (Gabatee 1). Kunuunsi Gabbina Biyyee Qindaa'aa (KGBQ) gosa soorataa %43.7tti guddisa, dikee xaa'oon makuun galii Birrii 41,938n dabala. Abbaan warraa yoo xiqqaate lafa %40 midhaan gara garaaf tajaajilamuun hongee dandamachuuf carraa guddaa qabu, kunis kanneen tuuta raawwilee madaqsan lakkoofsa olaanaa galmeessuuni. Walumaagalatti, waan gara garaa madaqsuun waan tokko qofa madaqsuurra yeroo hunda caalmaa qaba, innis bu'aa nageenyaafi dandamannaa jabaafi dhaabbataa ta'e argamsiisuuni.

Gabatee 1: Dhiibbaa gosoota gara garaa RMQQ madaqsuun hiyyumaafi nageenya irratti qabu.

Vaaraabiloota Argaman	Galtee RMQQ	Murtoo Qotee Bulaa		
		Madaqsuuf	Kan Hinmadaqsine	Dhiibbaa Yaalii
		Actual	Counterfactual	ATT
Qabxii gosa nyaataa abbootii warraa	C ₁ E ₀ F ₀	6.208	4.511	1.696***
	C ₀ E ₁ F ₀	5.652	3.181	2.471***
	C ₀ E ₀ F ₁	5.706	5.403	0.303
	C ₁ E ₁ F ₀	6.229	5.860	0.369***
	C ₁ E ₀ F ₁	4.333	2.729	1.604***
	C ₀ E ₁ F ₁	4.571	3.581	0.989***
	C ₁ E ₁ F ₁	6.047	5.529	0.517***
Galii	C ₁ E ₀ F ₀	32021.67	6987.05	25034.61***
	C ₀ E ₁ F ₀	31033.91	24360.08	6673.83***
	C ₀ E ₀ F ₁	7347.06	15637.69	11709.37
	C ₁ E ₁ F ₀	29603.64	19583.34	10020.3***
	C ₁ E ₀ F ₁	41938.1	21805.1	20133***
	C ₀ E ₁ F ₁	31941.43	6717.17	25224.26***
	C ₁ E ₁ F ₁	34508.98	7714.87	16794.11***
Baasii fayyadamaa ga'eessa tokkoo	L ₁ R ₀ M ₀	8472.77	7647.52	825.25**
	L ₀ R ₁ M ₀	10506.05	10289.19	216.86
	L ₀ R ₀ M ₁	13743.27	5550.57	8192.69***
	L ₁ R ₁ M ₀	9014.54	.10 (309	1297.43***
	L ₁ R ₀ M ₁	9525.36	5591.76 (373.49)	3933.60***
	L ₀ R ₁ M ₁	11524.72	8592.27 (466.28)	2932.44***
	L ₁ R ₁ M ₁	14659.94	3911.73 (927.65)	10748.21***

Hubachiisa: Kompoostii(C), Lolaa(E), Xaa'oo(F), Wal keessa Facaasuu(L), Jijjiiruu(R), Huwwisuu(M).

Yaada Imaammataa

- Ministeerri Qonnaafi birowwan naannoo tuuta raawwilee qonnaa qindaa'oo kunuunsa qonnaa, to'annoo gabbina biyyeefi gosa midhaanii baay'isuu bu'aa nageenyaafi dandamannaa guddisa of keessaa qabu jajjabeessuu qabu.
- Ministeerri Qonnaa, Institiyuutiin Raaga Haala Qilleensaa Itiyoophiyaafi kaanneen dhimmi kun ilaallatu kaka'umsa mala qonna qindaa'aa gama odeeffannoo haala qilleensaa sadarkaa gadiitti dabarsuufi kara ergaa gabaabaan dursanii hakeekkachiisuu, raadiyoofi caasaalee qotee bulaa madaqsuu tumsuu qabu.
- Interpiraayizoonni sanyii federaalaafi naannoo, waldaaleen hojii gamtaafi dhaabbileen kanaan wal qabatan sanyiiwwan hongee dandamachuun mirkanaa'aniifi galteewwan murteessoo haala itti argatan haala mijeessuu, qotee bulaas midhaan adda addaa akka facaasu ga'oomsuu qabu.
- Hojjettoonni ekisteenshinii qonnaa, hojiirra oolmaa RMQQ, to'annoo balaa qilleensaafi tajaajila gorsaa qonnaan bultootaa irratti bakka bu'oota misoomaaf leenjii ga'umsa irratti hundaa'e kennuu qabu.



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VI

Mooraa Raafamni Si'ataa Jirutti Qajeelfama Ijaarsaa Biyyoolessaa Fooyyessuuf Ragaa Jiyoofiiziksii: Hubannoo Yuunivarsiitii Haramayaa irraa Argame

Baqqaluu Ababaa¹, Galaanaa Amantee¹, fi Hanaa Tashoomaa¹

¹Kutaa Barnoota Fiziiksii, Koleejii Saayinsii Uumamaa fi Herreegaa, Yuunivarsiitii Haramaayaa, Itiyoophiyaa

Ergaawwan Ijoo

- Mooraa Yuunivarsiitii Haramayaa guddicha jala naannooowwan dhokataa amala sochii qaban jiraachuu qo'annoo jiyoofiiziksiin adda ba'eera.
- Naannoon qindaa'ina dadhabaa qaban hedduun kan huwwisa iittisuu gadaanaa qabaniin guutameefi caccabni kan mul'atan ta'ee, kun ammoo kirkira lafaa sadarkaa gadaanaallee akka hammaatu taasisuu malu.
- Mooraa Yuunivarsiitii Haramayaa gidduu (Profile 3) fi naannoo kibba-bahaa (Profile 4) keessatti fofottoqa haphiifi tuttuqqaa jiyoooloojii lafaa qo'annoon jiyoofiiziksii kan adda baase yoo ta'u, gara fuula duraatti naannowwan kun ijaarsaaf mijatoo akka hintaanedha.
- Gama magnetic anomaly maps, pseudo-depth sections, fi 2D modeling-n ragaan argaman hundi wal deeggaruun biyyeen gad aanu lafaa ta'uufi sararoota humna dogoggoraa qaban ta'uu mirkaneessuun, kunis naannoo saaxilamummaa kirkira lafaa olaanaa ta'uu agarsiisa.

Seensa

Kirkirri lafaa, keessattuu naannowwan dhooqa beekamoo Itiyoophiyaa keessatti lubbuufi qabeenya irratti gaaga'ama guddaa uuma. Baha Itiyaaphiyaa, daangaa Haramaayaa-Dirre Dawaa dabalatee kirkirri lafaa yeroo dhihootti irra deddeebiin mudateera.

Kanneen keessaa, 3.0 Mw kaaba Yuunivarsiitii Hramaayaa (2021), 4.5 Mw Dirre Dawaafi Haramaayaa gidduufi 4.3 Mw naannoo Shinilleetti mudatanidha. Mudannoowwan kunneen kan agarsiisan, saaxilamummaafi madaalliin balaa kirkiraa durfamee gaggeeffamuun akka barbaachisudha. Balaa kirkira lafaarra akkaataan ijaarama lafaa, qindaa'ina dogoggoraafi wal madaalliin mekaanikaalaa biyyeefi dhakaa dhiibbaa geessisu; taateen xiqqaa tokkollee naannoo ijaarama biyyee tasaa (sedimentary formations), kan caccabaniiruufi naannoo laafinaan beekamanitti daran hammaata. Magaalaafi yuunivarsiitiwwan babal'achaa waan jiraniif, sarara dogoggoraa (fault lines) fi haala lafa jalaa tasgabbaa'aa hintaane adda baasuun bu'uuraalee misoomaa yaaddoo hinqabne, dandamachuu danda'an mirkaneessuuf murteessaa ta'a.

Yuunivarsiitiin Haramaya waggoota dhiyoo asitti babal'ina ijaarsaa hojjechaa kan jiru yoo ta'u, madaalliin jiyoofiziksii sirnaan qindaa'ina dogoggoraa lafa jalaa qorannoo kana dursee gaggeeffame hinjiru. Ijaarsaaleen akka daree barnootaa, doormiifi manneen yaalii baay'inaan ilaalcha jiyooteknika sadarkaa gubbaa irratti hundaa'uu qofaan kaartaa dogoggoraa lafa jalaa malee ijaaramani.

Kanneen dhiisuun balaa naannoo ykn bakka dogoggoroota si'atoo ykn naannoo gi'ooloogii dahabaatti ijaaruu fida. Qorannoon kun qindaa'ina lafaa haphii, garaa garummaa tiitooloojiifi dogoggoroota dhokatoo sakatta'uun akka addunyaatti beekamtii kan qaban sadarkaa ittisa elektirikaa (electrical resistivity) fi mala maagnetetaa (magnetic methods) lamaaniin gaggeeffamuun qaawwa jiru cufe. Kaayyoon hojii kanaas calaqqee dogoggoroota si'atoo, naannoo laafoofi gosa dhakaa mooraa Yuunivarsiitii Haramaayaaa jala jiru adda baasuufi ijaarsaafi karoora mooraa gara fuulduraaf qajeelfama ragaa irratti hundaa'e kennuudha.

Malaafi Argannoo

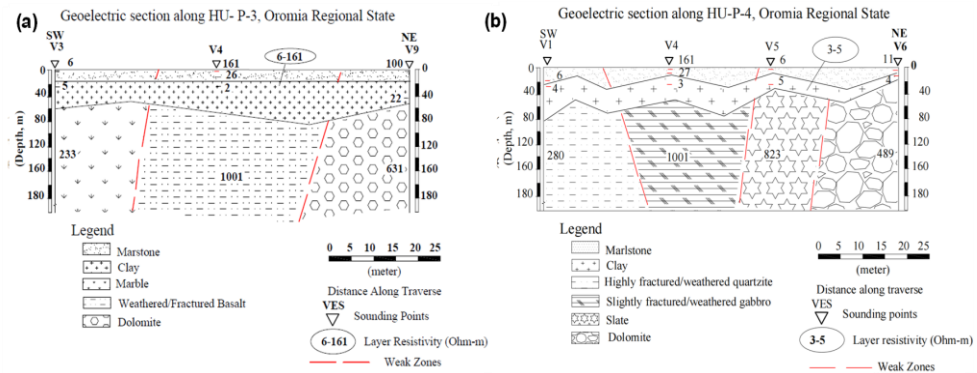
Qorannoon kanaan Vertical Electrical Soundings (VES) sagaliifi qabxiilee qo'annoo maagnetii 398 galmee gi'oogiraafii afur hundaaf PASI 16 GL Earth Resistivity Meter fi GSM-19T Proton Magnetometer tajaajilamuun hojiirra oolaniiru. Jabeenya ittisummaafi yabbina argachuuf ragaan VES sooftweerii WinResist tajaajilamuun yoo adeemsifaman, Geosoft Oasis Montaj tajaajilamuun ragaan maagnetawaa jijjiirama guyyaadhaaf sirreessuufi agarsiisuun raawwateera. Sooftiweronni AutoCAD and Surfer naannoolee dadhaboo, daangaa liitooloojiifi qindaa'ina dogoggoraa ta'uu malan adda kan baasan sadarkaalee ittisaa, kaartaa gadi fageenya jiruufi kaartaa garaa garummaa maagnetawaa walitti fiduuf tajaajile. Hiikkaa jiyo'elektirikaalaa kaa'uuf galmeen borehole taasifameera.

Qorannoon jiyoofiziksii walitti makame kun akka mul'isutti, Yuunivarsiitiin Haramayaa lafa jalaa naannoo dadhabaa hedduufi dogoggoroota si'atoo mudachuu malan kan of keessaa qabu yoo ta'u, kunis adda durummaan sadarkaalee biyyoo ittisa gadaanaa qaban, daangaa supheen badhaadhan, dhakaalee caccabaniifi tuttuqqaa litoolojawaa jeeqamen wal qabata. Gulantaaleen kun galmeewwan hunda keessa kan jiru ta'ee, Galmee 3 (mooraa gidduu) fi 4 (kibbabaha mooraa) jiyogiraafawaan qindaa'ina tasgaabaa'aa hintaane jabaa qabu.

Ragaa Electrical Resistivity Profiles-n, ragaan VES Galmee 3 (FAkii 1) sadarkaalee gurguddoo sadiiti mul'ata: sadarkaa oliitti dhakaa caccabinsa gara garaan jiru, lammaffaan sadarkaa ittisaa gadaanaan (2–22 Ω m) suphee yabbuufi ce'umsa fagoo gara dolomite, basalt, and marble-ti. Ittisummaa gadi aanaafi qabiyyeen jiidhina jijjiiramaa ta'uun kan mul'isu meeshaalee caccaboofi bishaaniin guutaman, kan dadhabina caasaa qabaniin ibsama. Kaartaan ofirraa ittisummaa gadi fageenya sobaa, naannoo ittisummaa bal'aa < 70 Ω m, sochii lafaa guddisan kan amala kuufama biyyee ykn haala qilleensaa jiraachuu mirkaneessa. Bakkeewwan VES-3 fi VES-4 gidduu jiran naannowwan dadhaboo gara garaa waan qabaniif, kun ammoo raafamni salphaa tokkoyyu hammaachuu akka danda'u agarsiisa.

Galmeen 4 haala jiyooloojii tasgabbaa'aa hintaane daran ifa ta'e kan calaqqisiisu agarsiisa (Fakkii 1). Gulantaan olii haala adda ta'een haphii (3 m), haala qilleensaa gadi fageenya hinqabnefi gulantaan sadaffaa ammoo dhakaa gosa adda addaa kan akka dolomite, slate, fractured gabbro, fi weathered quartzite kan guutamedha. Gulantaa sadaffaa keessatti gama mekaanikaalaan lafaa kan ta'e baay'ee caccabee argamuun gabbro kan mul'isu, daangaan dadhabaa gadirraa kaasee akka ta'edha. Kaartaan gad fageenya sobaa Galmee 4 keessatti haala wal fakkaatuun naannoowwan bal'aa ittisa gadi aanaa qaban (baay'inaan < 60 Ω m) mul'isu, kunis kuufama qola, jiidha ykn supheedhaan badhaadhe agarsiisa, isaanis raafama sochii hammeessuun beekamu.

Kaartaan maagnetawaa adda hinbaanee argannoo elektirikaalaa daran mirkaneesse. Kaartaan haftee hinbeekamnee, dhakaa addaan diigamaa ykn walitti maxxanaa calaqqisiisuun, naannoo saaxilamummaa maagneetii gadi aanaa bal'aa ta'uu agarsiisa.



Fakii 1. Kutaalee jiyoooloojii: (a) Galmee -3 (Naannoo gidduu), (b) Galmee-4 (kibbabaha mooraa).

Naannoowwan hanga ta'een amala hinbaramne ol'aanaa qaban adeemsa peedoojeenikii ykn seensa ibiddaa lafa jalaa irraa maagneetii guddisuu wajjin walsimu; waantonni adda hinbaane kun tuttuqaa liitooloojiifi dogoggora humna qabu hordofeeti. Kaartaan Analytical Signal fi Tilt Derivative boca fakii dogoggoraa kan calaqqisiisu yoo ta'u, baay'een isaanii NW–SE-tti deemu, kunis mooraa jalatti addaan ciccituun caasaa jiraachuu agarsiisa. Itti fufinsa dhabuun kunneen litoloojii harkisa gadaanaafi harkisa olaanaa gidduu daangaa ta'ee mul'ata. Kaartaan Tilt Derivative tuttuqaawwan gadi fageenya gara garaa adda baas, Euler Deconvolution ammoo gadi fageenya m 138–203 irratti naannoowwan dadhaboo dogoggoraan walqabatan fura, kana malees tasgabbi dhabuun lafa jalaa jiraachuu isaa daran mirkaneessa. Ragaaleen walitti dhufan akka mul'isanitti, bakkeewwan hedduun guutuu Yunivarsiitii Haramayaatti zoonii oloo kan kirkira lafaa xixiqqoo haalaan guddisu, keessumaa bakka gulantaan suphee, dhagaa diigamaa, gabbro caccabeefi marlstone wal fakkaatu. Qindaa'inni jiyoooloojii akkasii hidhata jabaa dhabuufi amala diigamuu qabaachuu isaaniin balaa raafama olaanaa akka saaxilaman baay'ee beekamaadha. Kanaafuu, ijaarsi naannolee kanneenitti taasifamu dhiifamuu qaba, caasaaleen zoonii laafoo jedhamanii adda baafamnii jiranitti dhihoo kan ta'an balaa raafamaaf saaxilamummaan isaanii qaba.

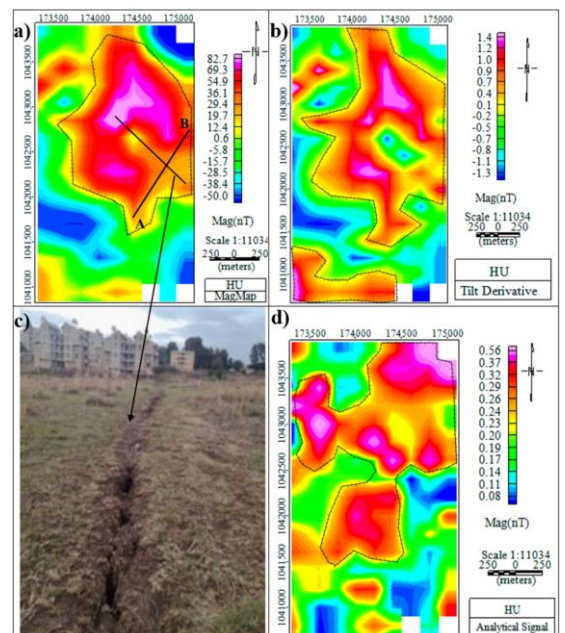


Figure 2: a) Residual magnetic map, b) Tilt Derivative map, c) Northwest-Southeast (NW-SE) orientation of features observed in the study area, and d) Analytical signal map.

Yaada Imaammataa

- Ministeerri Misooma Magaalaafi Mana Jireenyaa pirojektoota ijaarsaa gurguddoo mooraa yunivarsiitii naannolee sosochiif saaxilamoo ta'an keessatti raggaasisuun dura madaallii jiyoofiziksii lafa jalaa kanneen akka qorannoo elektirikii dandamachuufi maagneetii ulaagaa taasisuu qaba.
- Yuunivarsiitiin Haramayaa kutaalee giddu galeessaafi kibba-baha mooraa kan qorannoon jiyoofiziksii caccabni gadi fagoofi tuttuqaa jiyoooloojii dadhabaa (Galmee 3 fi 4) ta'uu argate, ijaarsa gara fuula duraatiif waan hinmijoofneef ijaarsa haaraa dhaabuu qaba.
- Komishiniin To'annoo Balaa Biyyaalessaa qajeelfama qophii kirkira lafaafi karoora itti fayyadama lafaa keessatti kaartaa dogoggora jiyoofiziksii hammachuu qaba.
- Dhaabbileen injinariingiifi ijaarsaa yunivarsiitiiwwan waliin hojjetan bu'aa jiyoofiziksii dizaayinii ijaarsaatti makuun istaandaardii dandamannaa raafamaa mirkaneessuu qabu.



YUUNIVARSIITII HARAMAAYAA

BIIROO DHIMMA QORANNOO

IBSA IMAAMMATAA 6.2

Caamsaa 2018

GOOROO
QORANNOO

VI

Raadiyooloojii irraa Walabummaa Fayyadaama Jimaa: Xiinxala Ragaa Biyyeefi Baalaa Aanaa Guraawaa

Jaafaar

Masaay Tachaan¹, Galaanaa Amantee¹, Isheetuu Dirriibaa¹, fi Taklawayinii Barihee¹

¹Kutaa Barnoota Fiziiksii, Koleejii Saayinsii Uumamaa fi Herreegaa, Yuunivarsiitii Haramaayaa, Itiyoophiyaa

Ergaawwan Ijoo

- Baalli jimaa Aanaa Guraawaatti kuufama raadiyoo'aktiivii uumamaa safaramuu danda'u qaba, giddugaleessaan qindoomina sochii $^{238}\text{U} = 6.54 \text{ Bq/kg}$, $^{232}\text{Th} = 12.58 \text{ Bq/kg}$ fi $^{40}\text{K} = 361.4 \text{ Bq/kg}$ dha.
- Jimaa fayyadamuun hanga waggaatti qaama namaa seenu hanga koomishiniin ittisa raadiyooloojii addunyaa kaa'e (1 mSv/waggaa) kan darbuufi saaxilamummaa takkaan hanga eeyyamamu 0.3 mSv/waggaa dachaa sadiin caala.
- Iddattoon jimaa tokko tokko hanga qaama seenu 3.01 mSv/waggaa oomishu, kaneen guyyuu jimaa qama'aniif yeroo dheeraa booda rakkoo fayyaa akka ta'e agarsiisa.

Seensa

Qabiyyee raadiyo'aktiivii uumamaan mudatan (QRUM) kanneen akka uranium (^{238}U , ^{235}U), thorium (^{232}Th), fi potassium-40 (^{40}K) biyyee, nyaataafi biqiltuu hunda keessa jiru. Kuufamni isaanii amala lafaa (geology), qindaa'ina biyyee (soil chemistry) fi gosa midhaaniin garaa garummaa qaba. Raadiyonukilaayidoonni kun akka waliigalaatti gadi aanaa ta'anis, midhaan faalame yeroo dheeraaf fayyadamuun saaxilamummaa calaqqee keessaa dabala, kunis balaa fayyaa kan akka kaansarii, miidhaa qaamaa (organ) fi dhiibbaa jeneetikii fiduu danda'a. Baha Itiyoophiyaa, bakka jimaan bal'inaan

oomishamuufi fayyadamamutti, raadiyonukilayid biyyee irraa gara biqiltoota nyaatamanitti daddarbinsa isaa qorachuun dhimma fayyaa, akkasumas dhimma dinagdeetis.

Baha Harargeetti Aanaan Guraawaa, naannoo oomisha jimaan hedduu beekamtudha. Hawaasni naannoo taateewwan hinbaratamne kanneen akka ibidda ofumaan ka'uufi waanti akka qaanqee mudachuu kan himan balaa hinyaadamne naannoo irratti mudachuu akka danda'u akeekkachiisa. Akkuma aadaan fayyadama jimaa babal'ateefi guyyuu ta'e, nageenya raadiyooloojii isaan wal qabatu hubachuun barbaachisaadha. Qorannoon kun safarrtuu sirnaa jalqabaa sadarkaa raadiyooloojii uumamaa biyyeefi baala jimaa gandoota sadii (Tuuta Jannataa, Mudana Jiruu Ballinaafi Gorroo) irraa kan dhiheesse yoo ta'u, qajeelcha fayyaa hawaasaa, to'annoo qonnaafi tarkaanfiwwan to'annoo odeeffannoon akka qaqqabu ragaaleen kennamaniiru.

Malaafi Argannoo

Ooyruu jimaa gandoota sadii aanaa Guraawaa keessaa saamuda biyyee 12 (gadi fageenya 0-30cm) fi baala jimaa 12ti funaaname. Saamudni hunduu kan gogfaman, kan wal fakkeeffaman (homogenized) fi xiinxalaman, laaboraatoorii

Abbaa Taayitaa Teeknooloojii Itiyoophiyaatti meeshaa germanium qulqullina olaanaa (HPGe) saaxiltuu gamma-ray fayyadamuuni. Kuufamni raawwii ^{238}U , ^{232}Th , ^{235}U , fi ^{40}K , galmee calaaqqee raadiyoloojii kan ta'an taatee gita raadiyemii, hanga ofitti fudhatamee, waggaatti hanga argamu, sadarkaa balaa (Hex, Hin) fi carraa balaa kaanserii umrii keessatti jiru dabalachuun ulaagaa UNSCEAR fi ICRP hordofuun herregame.

Saamuda biyyee aanaa Guraawaatii fudhatameen kuufamni raawwii kan mul'isu, raadiyoo niwukilayidoota uumamaan argaman akka waliigalaatti daangaa nageenya idil-addunyaa keessa jira. Kuufamni giddu galeessaa safarame ^{238}U -f 17.22 ± 1.22 Bq/kg, ^{232}Th -f 34.50 ± 2.67 Bq/kg, ^{40}K -f 275.75 ± 4.11 Bq/kg fi ^{235}U -f 2.26 ± 0.64 Bq/kg sadarkaa biyyee uumamaan madaalamaniin kan boodaa hanga ta'een ol ka'uu mul'ise waliin. Indeksii balaa raadiyoloojii walgitu kanneen akka sochii raadiyemii wal gitaa (87.79 Bq/kg), hanga ofitti fudhatamee (40.71 nGy /h), doosii ga'aa waggaatti alaa argatamu (0.05 mSv/y), doosii ga'aa waggaatti manaa argatamu keessaa (0.20 mSv/y) fi carraa balaa kaansarii umurii keessatti jiru (0.17×10^{-3}) hundi giddugaleessa sadarkaa addunyaatti taa'ee gadi jiru.

Baalli jimaa ooyruu wal fakkaataa irraa fudhatame, darbinsa radiyoniwukilaayidii biyyee irraa biqiltuuttii addabaafamuu danda'uti mul'ate. Giddu galeessi kuufama taatee ^{238}U -f 6.54 ± 1.02 Bq/kg, ^{232}Th -f 12.58 ± 0.88 Bq/kg fi ^{40}K -f 361.4 ± 25.1 Bq/kg yoo ta'an, jimaa Yemenii ^{238}U olaanaa qabaachuu irraa kan darbe, jimaa Keeniyaa fi Yemeniin yoo wal bira qabamu gadaanaadha. Kunis, xiyyeeffannoon kennamu bakkaan daanga'aa akka ta'edha. Ga'eessi guyyaatti kg0.5 qama'u waggaatti hanga gara qaamaa seenu 0.37 hanga 3.01 mSy yoo tilmaamamu, daangaa hanga ICRP waggaatti 1 mSy kaa'erra darbuun giddu galeessaan 1.09 mSy ta'uufi gosa nyaataa tokkorraa hanga argamuu malu 0.3 mSy dacha sadii oliin darbe. Saamudni tokko tokko 3 mSy/waggaa darbu, kunis guyyaa tokkotti baayyee fayyadamuun hanga raadiyoloojii fudhatamuu qabatamaan dabala. Sadarkaa kanaan qaama seenuun mudannoo rakkoo yeroo dheeraa dabala, kanneen akka kaanserii, lafeefi kalee keessa kuufama radiyoniwukilaayid dabaluu fi araada jimaa qama'uu kanneen qaban irratti kuufama saaxilamuu keessaa dabaluu hammata. Xumurarratti, qorannoo kanaaf kaka'umsa kan ta'e gama tokkoon ibiddaafi qaanqeeff hawaasni aanaa Guraawaa saaxilamuu; raadiyo'aktii-viitiin biyyee daangaa baramaa keessa ta'us, argannoo qorannoo yaaddoo ummataa ragaa saayinsiitiin furuuf hordoffiin naannoo itti fufiinsa qabu barbaachisaa ta'uu agarsiisa.

Gabatee 1: Walbira qabama hamma raadiyoonuuklaayidii fi agarsiistota balaa raadiyooleejii.

Safartuu	Biyyee (Mean $\pm$ SD)	Baala Jimaa (Mean $\pm$ SD)	Daangaa Idil-Addunyaa (Bq/kg)
^{238}U (Bq/kg)	17.22 $\pm$ 1.22	6.54 $\pm$ 1.02	~35 (soil average)
^{232}Th (Bq/kg)	34.50 $\pm$ 2.67	12.58 $\pm$ 0.88	~45 (soil average)
^{40}K (Bq/kg)	275.75 $\pm$ 4.11	361.4 $\pm$ 25.1	~420 (soil average)
^{235}U (Bq/kg)	2.26 $\pm$ 0.64	—	No global reference
Radium Equivalent (Ra_eq)	87.79 Bq/kg	—	89 Bq/kg
Absorbed Dose Rate (nGy/h)	40.71	—	59
Outdoor Annual Dose (mSv/y)	0.05	—	0.07
Indoor Annual Dose (mSv/y)	0.2	—	0.41
Ingestion Dose (mSv/y)	—	1.09 (0.37–3.01)	1 mSv/y (ICRP limit); 0.3 mSv/y

Yaada Imaammataa

- Ministeerri Fayyaa jimaa fayyummaan isaa eegame fayyadamuu irratti qajeelfama ummataa kennuufi balaa fayyaa calaqqeen walqabatee dhufuu danda’u irratti hubannoo uumuu qaba.
- Abbaan Taayitaa Nyaataafi Qorichaa Itiyoophiyaa qorannoo raadiyooniwwukilaayidii jimaa qorachuufi qabiyyee raadiyoo’aktiivii oomishaalee jimaa keessatti argaman irratti daangaa hayyamame kaa’uu qaba.
- Abbaan Taayitaa Ittisa Raadiyaashinii Itiyoophiyaa biyyeefi ooyruu jimaa aanaa Gurawaa yeroo yeroon hordofuufi dabalataan sadarkaa olka’insa ^{235}U argame qorachuu qaba.
- Ministeerri Qonnaa sakatta’iinsa raadiyoloojii tajaajila ekisteenshinii isaa keessatti dabaluu qonnaan bultoonni hojii qonnaa fayyaaleessa akka tajaajilaman tumsuu qaba.
- Yuunivarsiitiin Haramayaafi dhaabbileen qorannoo raadiyoonuukilaayidii biyyee irraa gara biqiltuutti darbu qorannoo yeroo dheeraa gaggeessuufi tattaaffii hordoffii naannoo sadarkaa gadii jiraniif tumsa teknikaa gochuu itti fufuu qabu.



Mission

Undertake knowledge-generating, problem-solving and cutting-edge research, and provide demand-driven, transformative community engagement activities that contribute to local, national, regional and sustainable development.

Vision

Haramaya University aspires to be one of the top ten universities in Eastern Africa with an international reputation by 2030.

Goal

To develop into an autonomous, independent graduate and research university (academic and research institute) recognized for competitive national and international quality and relevance in its teaching, research and community engagement.

Haramaya University – Research Themes and Sub-themes

Theme 1: Productivity and Environmental Sustainability for Food Security and Poverty Alleviation

Sub-themes:

- Animal production and health
- Plant production and health
- Environment, natural resources, and climate change

Theme 2: Human Health, Nutrition and Welfare

Sub-themes:

- Health promotion and disease prevention
- Advances in curative and rehabilitative health services and disease management
- Nutrition, food safety and security, dietetics, and nutritional problems
- Reproductive health, maternal and child health

Theme 3: Energy, Engineering, and Information Technologies

Sub-themes:

- Information technology and computing
- Advanced materials research and development
- Energy resource development and utilization
- Postharvest technology, processing, and food analysis
- Civil infrastructure, manufacturing, and industrial technology

Theme 4: Human and Social Development

Sub-themes:

- Society, culture, and tourism
- Educational advancement and quality assurance
- Population, gender, and development
- Governance and the rule of law

Theme 5: Institutions, Innovation Systems, and Economic Development

Sub-themes:

- Economic development, policy, and institutional analysis
- systems and impact evaluation studies

Theme 6: Basic Science Research

Sub-themes:

- Bioscience research
- Chemical science research
- Biophysics and computational physics
- Mathematical research