

Tshivenda

Zwithu zwa ndeme kha vhushaka ha Afurika Tshipembe na Saintsi: Mvelelo dza thoquluso ya 2022



science, technology
& innovation

Department:
Science, Technology and Innovation
REPUBLIC OF SOUTH AFRICA



HSRC
Human Sciences
Research Council

Eyi mivhigo i nga waniwa hu sina mbadelo u bva kha dzi linki dza DSI na HSRC:



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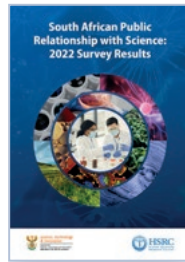
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Zwo bveledzisiwa nga vha Human Sciences Research Council (HSRC) nga fhasi ha vha Department ya Science na Innovation (DSI).

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U bula muvhigo uyu:

Muhasho wa saintsi na vhubvedzi (2024) zwa ndeme zwa vhushaka ha lushaka lwa Afurika Tshipembe na Saintsi: Mvelelo dza tshoquluso dza gidimbili fumbilimbili. Zwo lugiswa nga vha khoro wa tshoquluso dza saintsi ya vhatu I tshi itelwa vha muhasho wa saintsi na mveledziso. Pitso: HSRC



Zwa ndeme nga ha muvhigo uyu zwi bva kha muvhigo wo fhelelaho:

Muhasho wa saintsi na vhubvedzi (2024) zwa vhushaka ha lushaka lwa Afurika Tshipembe na Saintsi: Zwo lugiswa nga vha khoro wa tshoquluso dza saintsi ya vhatu I tshi itelwa vha muhasho wa saintsi na mveledziso. Pitso: HSRC

Komiti ya mvumbo na maitete a nomboro ya REC/U vusuludzwa ha maitete a nomboro ya REC 5/17/08/11: South African Social Attitudes Survey (SASAS) 2019.

Vha South African Public Relationship with Science (SAPRS): Mvelelo dza tsenguluso dza 2022 tshipikwa tsha minwaha I fhiraho miṅa ya u shuma I katelaho u tlanganya ngudo, u bveledza zwishumiswa, u kuvhanyanya mafhungo, u senguluswa ha mafhungo, na u ṅwalwa ha muvhingo.

Ho vha hu tshumisano vhukati ha yunithi ya u hudziwa ha saintsi kha muhasho wa saintsi na mveledziso na vha Equitable Education and Economies (EEE) mbekanya mushumo ya tshoqisiso kha khoro ya tshoqisiso ya saintsi ya vhatu. Vha thimu ya DSI vho rangwa phanḁa nga Mr Isaac Ramovha na vha thimu ya tshoqisiso ya HSRC nga Dr Vijay Reddy.

Kha minwaha miṅa, mirado ya tshigwada tsha tshoqisiso yan deme vho vha vha Dr Vijay Reddy, Dr Benjamin Roberts, Ms Sylvia Hannan, and Dr Steven Gordon.



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1 Mathomo

Ndivho ya saintsii i takusa ndila ine ra pfesesa ngayo shango, riṅe vhaṅe, na u vha hone hashu. Hu na thendelano yo ṅandavhuwaho ya uri zwipikwa zwa saintsii zwi fanela u fhira masiandaitwa a ikonomi na thekhinolodzhi, u tandulula khaedu dza musalauno dza lifhasi na dzapo dzine dza kwama matshilo ashu. U bva kha maḍuvha a kale, muvhuso wa Afrika Tshipembe wa demokirasi wo dzhiela nṅha vhundeme ha vhushaka vhukati ha lushaka na saintsii, na uri Ma-Afrika Tshipembe vhoṅhe vha fanela u shela mulenzhe kha u bvelela ha National System of Innovation (NSI).

Muhashowa Saintsii namveledziso, khathihi navhafarisanivhawo, unavhuḍifhinduleli ha u takusa u dzhenelela ha saintsii nga ngomu ha NSI. Mbekanyamushumo ya zwenezwino ya bammbiri litshena kha Science, Technology and Innovation (STI) yo fhaṅiwaho kha vhukando ho fhiraho nga u ṅuṅuwedza tshitshavha tshi ḍivhe zwi kwamaho saintsii na u vha khagala ha saintsii, khathihi na u sedza hafhu kha saintsii – vhuṅumani ha tshitshavha (DST 2019a). U ṅola mvelaphanḍa kha u swikelela tshitshavha tshi ṅoḍeaho tsha saintsii na u ḍivha saintsii, DSI yo thoma ya vhekanya zwisumbenzi zwa u tola kushumele kwa u dzhenelela ha tshiteṅwa tsha saintsii fhethu hoṅhe. Tsha vhuvhili, yo ṅanganedza lushaka lwa zwisumbenzi zwiṅuku u itela u ḍivhadza tsenguluso ya tshifhinganyana ya tshitshavha tsha vathu vhahulwane vha lushaka lwa Afurika Tshipembe u itela u kala na u ṅola zwikalo zwa ndivho ya saintsii, mavhonele, na u dzhenelela.

Mbekanyamushumo dza u dzhenelela ha saintsii na u kala vhushaka vhukati ha lushaka na saintsii zwo vha zwo vhwewa kha tshiimiswa nga kha mbekanyamaitele na ndila dzo vhalaho, zwine zwa vha ndila ya u dzhenelela ha Saintsii (DST, 2015),

vha Bammbiri litshena kha Saintsii, Thekhinolodzhi na Mveledziso (DST, 2019a), Vha u ṅola na u sedzulusa u ḍi dzhenisa ha maga a Saintsii (DST, 2019b), khathihi na vha u ṅola na u sedzulusa vhundeme ha maga na u sumbedza u ḍi dzhenisa ha Saintsii (DST, 2021).

Tsenguluso ya u thoma yo ṅanganelaho yo livhiswaho kha u kala na u ṅola maimo a lushaka kha ndivho ya saintsii, mavhonele, na u ḍi dzhenisa zwo itwa nga 2022. Tsenguluso i ḍo dovhoololwa miṅwaha miṅanu miṅwe na miṅwe. Muvhigo wo fhelelaho – [Vhushaka ha lushaka lwa Afurika Tshipembe na ṅoḍuluso ya Saintsii: Mvelelo dza 2022 \(DSI, 2024\)](#) dzo anḍadzwa. Hezwi zwi bvisela khagala muvhigo na maitete a Science Engagement Monitoring and Evaluation Impact Indicator Framework (SEMEIIF) zwe zwa ḍivhadza u fhaṅwa ha ndivho ya saintsii dza fumbilisumbe, mavhonele, na maga a u ḍi dzhenisa. Nga murahu ha zwenezwo, ri pfufhifhadza mvelelo dza ndeme nga u ṅalusa zwikalo (tshikoro tsha vhukati) kha maga o fhambanaho, khathihi na u fhambana ha tshikoro tsha muelo muṅwe na muṅwe. Zwi tevhelaho, ri vhiga uri ndi zwifhio zwivhumbeo zwa matshilisano-a demogirafi zwine zwa vha na khonadzeo khulwane ya u isa kha ndivho yavhuḍi ya saintsii, mavhonele, na u ḍi dzhenisa.

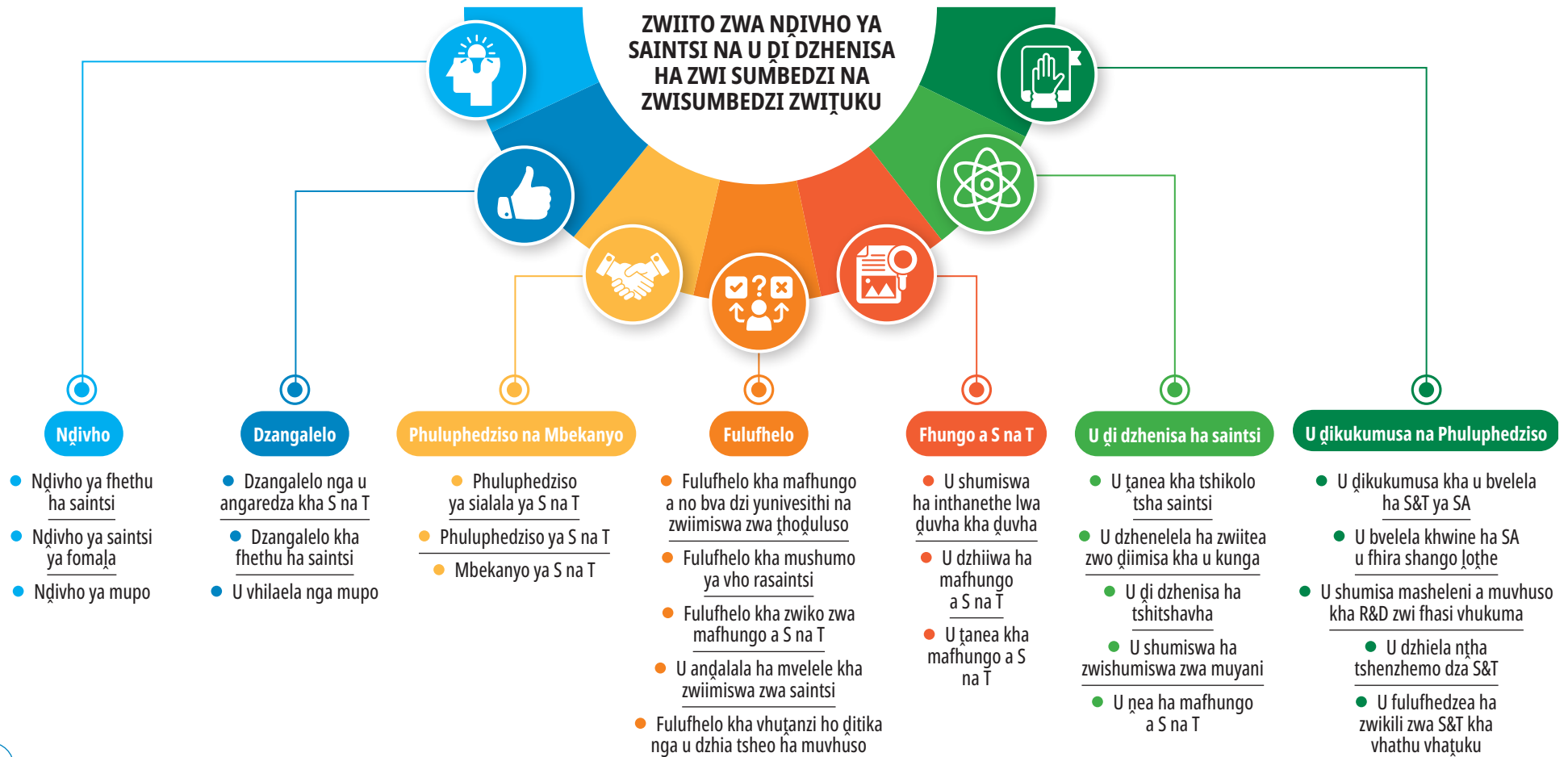
Ri mbo ḍi ṅetshedza minwe ya vhushaka ha lushaka lwa Afurika Tshipembe na saintsii ri tshi shumisa zwikoro zwa vhukati na u fhambana nga ngomu ha maga maṅwe na maṅwe a saintsii a fumbilisumbe. Ri mboḍi khethekanya haya maga a vha mathihi kha khethekanyo nṅa dzo ḍisendekaho kha tshikoro tsha vhukati na u fhambana ha tshikoro. Ri phetha nga u pfufhifhadza mvelelo na themendelo.

2 Maitele a ngudo

Ndingo/Vhadzulapo	Ndingo I imelaho vhadzulapo vha lushaka vha vhaaluwavha miṅwaha ya fumi rathi na u fhira, vho khethiwaho u bva kha vhupo ha 500 u mona na mavunḑu a ṭahe.
Tshivhalo tsha Ndingo	Vha 5 960 vho fhindula kha ndingo ya lushaka.
Tshishumiswa tsha u sengulusa na muhanga wa u vhiga	Vha muhanga wa u ṭola na u sedzulusa u ḑi dzhenisa ha maga a Saintsi vho ḑivhadza u aluwa ha tshishumiswa tsha u sengulusa na tsha tshivhumbeo tsha muvhigo.
Inthaviyu ya tsenguluso	Vhukati ha ḽara 2022 na Phando 2023, Ho itwa inthaviyu ya awara nthihi dza u ṭangana na vhatu vhahulwane vha miṅwaha ya fumi rathi u ya nṭha. Dzi inthaviyu edzi dzo itwa nga nthihi ya dzi nyambo dza fumi nthihi dza tshiofisi, u bva kha zwine vhafhinduli vha takalela.
U fara mafhungo	U humisa nḑila ya computer-assisted personal interviewing (CAPI), mafhungo o dzhiwaho kha personal digital assistant (PDA).
U kaliwa ha mafhungo	Mafhungo oṭhe o vha o kaliwa kha vhadzulapo vha miṅwaha ya fumi rathi u ya nṭha.
U vhiga mvelelo	Mvelelo dza ndeme dza dzi mbalo-mbalo kha fulufhelo ya phesenthe dza fuṭahe ṭhanu zwo vhidzwa.
Phambano kha lushaka lwa demogirafi	Miṅwaha, mbeu, tshiimo tsha un swikelela pfunzo, thikhedzo ya pfunzo ibvaho mahayani yo ḡetshedzwa nga vhabebi na vhanwe vhaaluwa (u tikedza u vhalo, shuṅwahaya nazwiṅwe), tshiimo tsha lushaka lwa ikonomi tsho ḑi imisa kha vhulapfu ha ndaka, tshiimo tsha makete ya vhashumi, fhethu tshikalo tshine vhudzulo havha hone, vhutendi kha vhurerele, na zwigwada zwa vhatu zwo shumiswa. Ri amba nga ha hezwi zwigwada zwiṭuku.
Ipfi 'saintsi' ḽi amba uri	U bveledzwa ha nḑivho kha zwa milayo ya pfunzo: saintsi ya mupo nay a vhutshilo, inzhiniyariṅi, saintsi ya matshilisano, na vhatu.
Ipfi lushaka ḽi wela kha vhuthihi na vhunzhi	Huna vhunzhi ha 'vhushaka' kha ḽa Afurika Tshipembe ḽo ḑi imisaho kha mupo wo fhambananaho wa lushaka. Naho, ipfi 'lushaka' ḽi tshi katela vhuvhili ha vhushaka vhuthihi na vhunzhi.
Ri shumisa mafhungo e a vhidzwa nga riṅ vhaṅe	Mafhungo o vha o dzhiwa nga kha mbudziso dza ṭhoḑuluso dze vho dzhenelelaho vho ḡea thero dza phindulo dza vhone vhaṅe vha songo panga khwaṭhisedza kha vha nḑa.
Zwikoro zwa vhukati	Zwikoro zwa vhuthihi na vhunzhi ha zwiṅhumbi zwa zwithu zwo shandukiswa u ya kha tshikalo tsha 0–100. Zwikoro zwa vhukati zwo longwa na u vhidzwa uya kha ṭhanganelo ya ḑana.
U fhambana ha zwikoro	Phambano vhukati ha vhuṅṭhesa nav hu fhasi ha zwikoro zwa vhukati, nga vha zwigwada zwiṭuku.

3 U ̧ola u dzhenelela ha Saintsi na muhanga wa tshumiso nya mvelelo dzau ̧ola

SEMEIIF yo vha yo fha̧iwa hafhu zwi̧uku u itela u katela zwisumbenzi zwa sumbe kana thero dza masiandoitwa na zwi̧alusi zwi̧uku zwa 27 kana maga a u shel mulenzhe. Zwi̧alusi zwo vha zwi ņivho na dzangalelo kha saintsi na thekhino̧odzhi (S&T); phuluphedziso na u vhlunga khathihi na mavhonele a u fulufhela; Mafhungo a S na T; na mvelelo dza u ̧i dzhenisa ha saintsi, hu tshi katelwa mihumbulo i tshimbilelanaho na u ̧ikukumusa na phuluphedziso na a S&T. U itela u kala na u shumisa tshumiso iņwe na iņwe ya u sumbedza kana thero ya masiandoitwa, ro topola vhukati ha masiandaitwa a maga mararu na ma̧anu. Kha zwi̧i̧a zwi tevhelaho, ri vhiga mvelelo dza ̧oho dza mafhungo kha maga ma̧we na ma̧we a masiandoitwa. U wana zwidodombenzwa zwo engedzeaho nga ha mvelelo kha vha sedze kha **muvhigo muhulwane**.

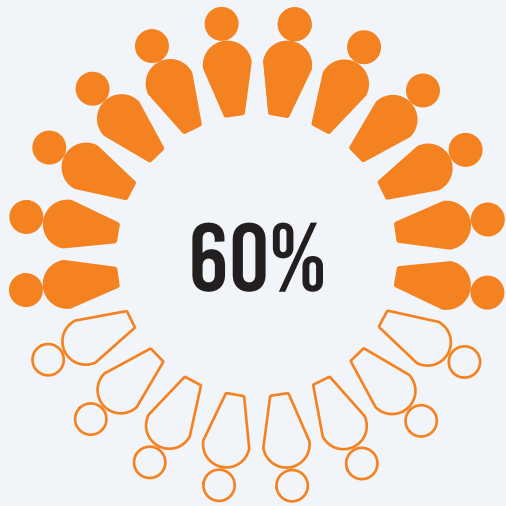


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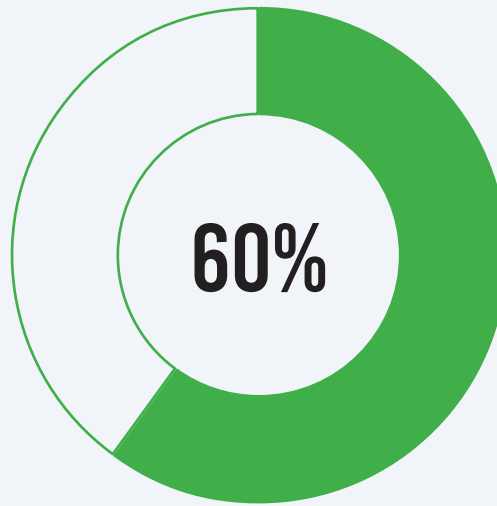
Ndivho ya tshitshavha na ndivho na dzangalelo kha saintsi na thekhinolodzhi

U divha na ndivho na dzangalelo kha S&T zwi netshedza ndivho nga ha lushaka lwa vhushaka vhukati ha tshitshavha na saintsi. Nga dzangalelo, ri amba u toda u divha zwinzhi, ndivho i amba mafhungo o no vhaho nao, ngeno ndivho i tshi sumbedza u divhadzwa, naho hu si nga u pfesesa.

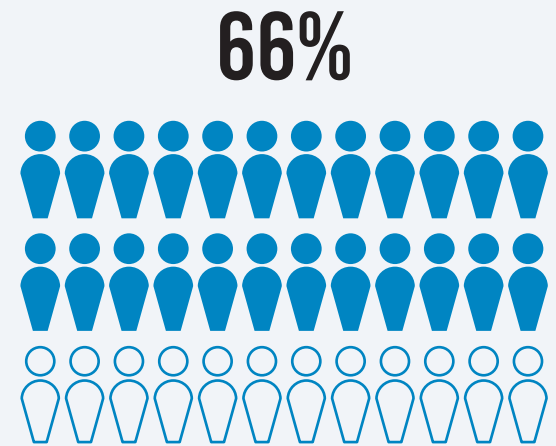
Lushaka lwo fhindula nga u fhambana nga ha zwikalo zwa dzangalelo lavho, ndivho, na ndivho ya S&T. Nga u angaredza, MaAfurika Tshipembe vha a divha zwavhudi, vha na ndivho nga ha na u vha na dzangalelo kha S&T.



vho vha vha tshi divha nga ha S&T



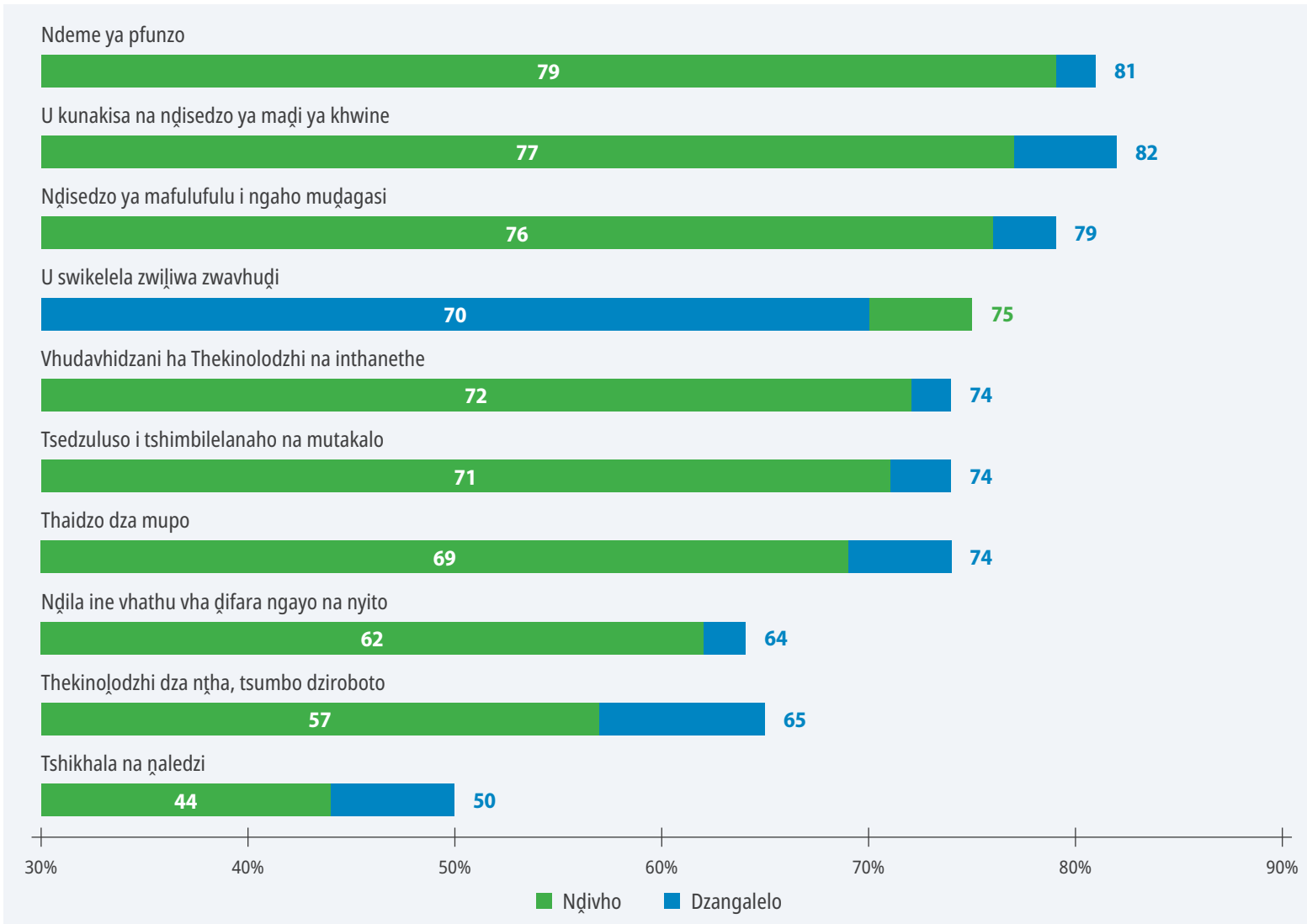
vho vha vha na ndivho ya saintsi ya fomala



vho vha vhe na dzangalelo kha S&T nga u angaredza

4.1 Phesenthe dza vhaaluwa vha re na ndivho na dzangalelo kha masia a saintsi a ndeme

U engedza kha zwenezwo, ro toḏisisa ndivho ya tshitshavha ya na dzangalelo kha khaedu dza tshitshavha dza musalauno dzine dza toḏa phindulo ya S&T.



**NḏILA KHULWANE
YA NḏIVHO**
Ndeme ya pfunzo

79%



**NḏILA KHULWANE
YA LUTAMO**

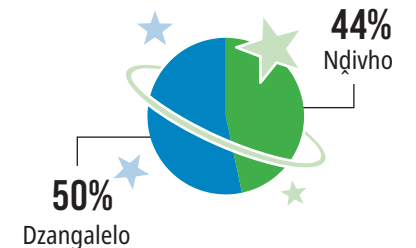
U kunakisa na ndisedzo
ya maḏi ya khwine

82%



**ḏILA ḏHUKHUSA YA NḏIVHO
NA LUTAMO**

Tshikhala na ḏaledzi



4.2 Zwikoro zwavhukati zwa nǃivho zwa na dzangalelo kha S na T, zwo sumbedzwa kha zwigwada zwituku u ya nga u angaredza



Ndi nnyi we a vha ana na nǃivho ya nǃha ya na lutamo kha S na T?

Ho vha na u fhambana huhulwane ha zwikoro kha zwigwada zwituku, zwire na zwikoro zwa vhukati kha nǃivho ya saintsi u bva kha 46 uya kha 71 u swika kha 100, na lutamo kha saintsi u bva kha 53 uya kha 75 u swika kha 100.

Vhe vhavha vha na nǃivho khulwane kha saintsi na lutamo:

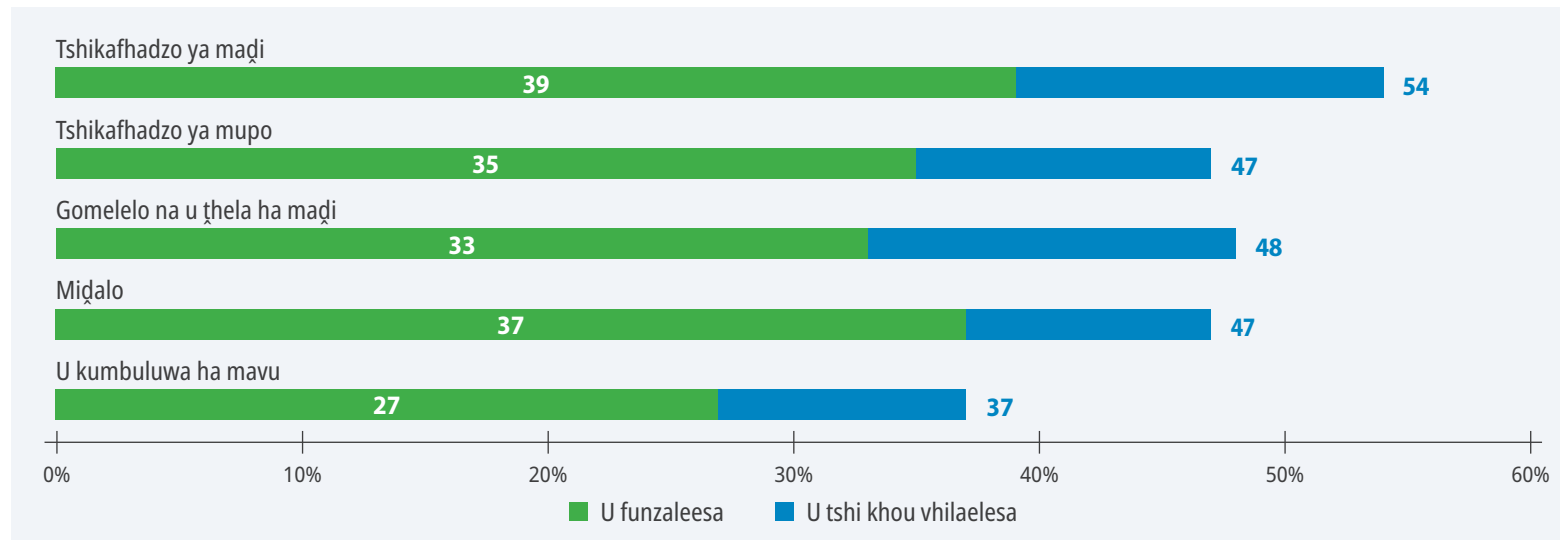
- vhovha vha vhatuku,
- vho swikelela pfunzo dza nǃha ha sekondari,
- vho vha na tshenzhemo zwi tshi ǃa kha thuthuwedzo khulwane ya mahayani kha zwa pfunzo, na uri
- vhovha vha tshibva mahayani a socio-economic status (SES) mahulwane.

Vhatshena na Ma india/ma asia vha hulwane vho vha na nǃivho khulwane ya S na T; huno Vhatshena, Vha Afurika vhatswu, na ma india/ma asia vha hulwane vho vha na lutamo luhulwane.

5 Ndivho ya lushaka ya na u vhilaedziswa nga zwiitea zwa mupo

Masiandoitwa a tshanduko ya kilima na zwiwo zwi si zwavhuḡi zwa mupo ndi mbilaelo ya lifhasi na ya Afurika Tshipembe. Vhaaluwa vhanzhi vho vhiga uri vho vha vha tshi vhilaedziswa nga zwiitea izwi zwa mupo u fhira u vha na ndivho ya 'vhukuma' kha zwiitea.

Phesenthe ya vhaaluwa vhe vha vha vha na ndivho nnzhi na u vhilaela hunzhi nga ha zwiitea kha mupo



Vhararu kha vhahulwane vhaḡa

vho vha na inwe ndivho ṭhukhu na u vhilaela nga ha zwiiteaho kha mupo



NDIVHO KHULWANE YA NA MBILAELO

Zwiitea kha mupo

47%
Mbilaelo

34%
Ndivho



Zwivhumbeo zwa vhane vha vha na ndivho ya nṭhesa na mbilaelo nga ha zwiitea zwa mupo

- Zwikoro zwa vhukati, nga tshigwada tshigṭuku, zwo vha zwi vhukati ha 56 na 74 (kha 100) u itela ndivho ya mupo, na vhukati ha 62 na 83 u itela u vhilaela nga ha mupo.
- Vhaaluwa vhe vha vha vhe na ndivho khulwane na u vhilaela nga ha zwiitea zwa mupo:
 - yo vha na pfunzo ya nga murahu ha sekondari, nahone yo tshenzhela thikhedzo ya pfunzo ya nṭha ya hayani,
 - vho vha vha tshi bva mahayani a SES o pfumaho, nahone
 - vho dzula vhuḡoni ha fomala na vhuḡo ha mahayani.
- Vhaaluwa vha vhatshena na vha India/vha Asia vho vha vhe na ndivho ya nṭhesa nga ha zwiitea zwa mupo ngeno vhaaluwa vha Vhatshena, Vha Afurika vhatswu, na vha India/Vha Asia vho vha vhe na mbilaelo khulwane nga ha zwiitea zwa mupo.

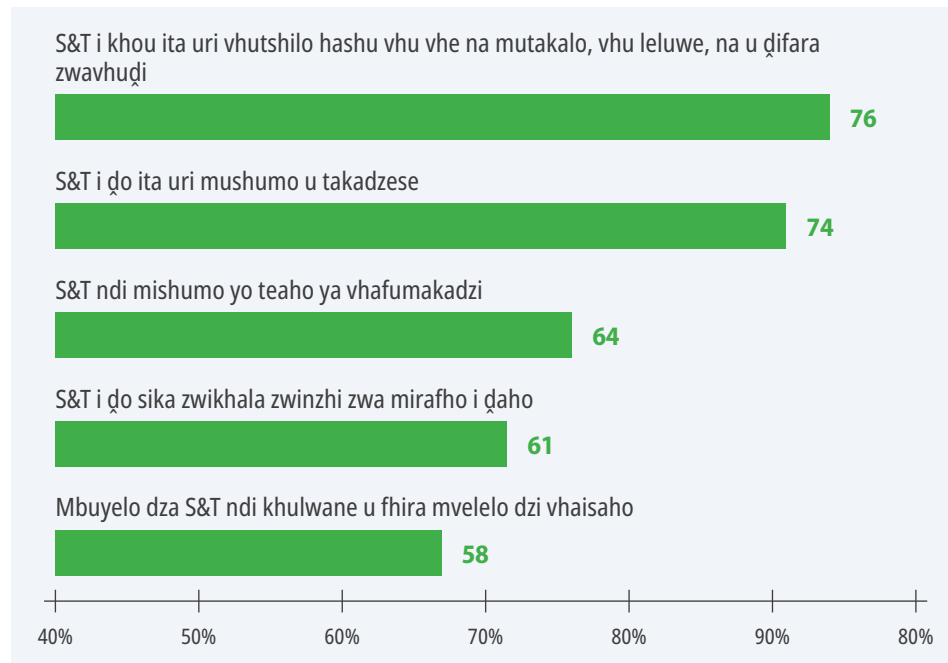
6 Mavhonele a fulufhedzisaho na a u vhulunga kha S&T ya musalauno na ya mvelele

Lushaka lwo fhindula kha sethe dza zwithu zwe zwa vhudziswa nga ha mavhonele avho a phuluphedziso (mbuelo dzine dza nga vha hone) na u vhulunga (mbilaelo, nyofho, na khombo) dzi tshimbilelanaho na saintsi ya musalauno na saintsi ya mvelele. Tshitshavha tsha Afurika Tshipembe tsho tšanganedza phuluphefhedziso na mbilaelo nga ha S&T.

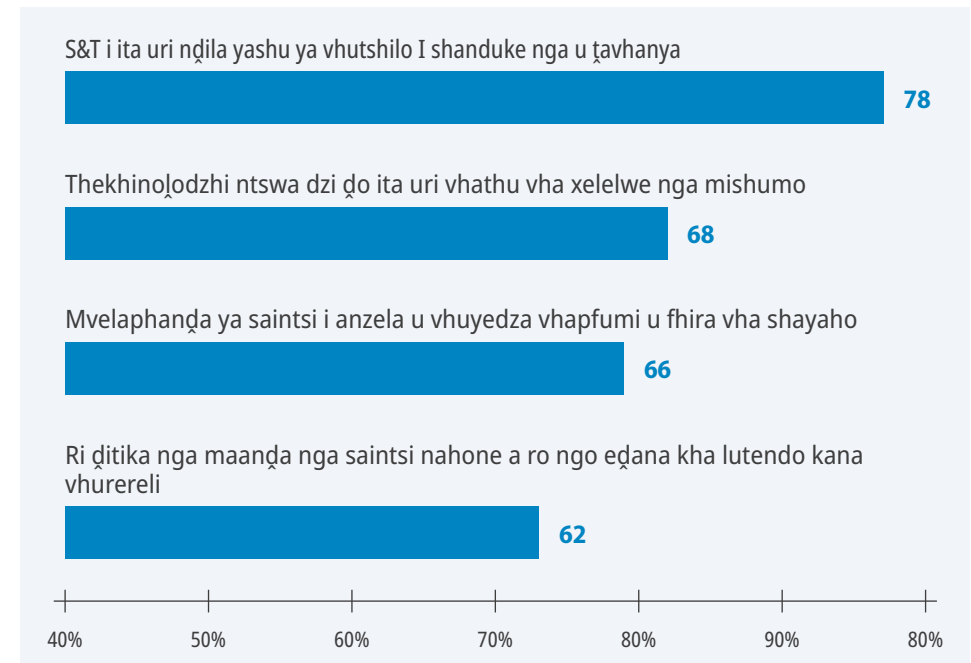
6.1 Mavhonele a phuluphedziso na a u vhulunga kha S&T ya musalauno

Mbuelo khulwane dzine dza nga vha hone dzo vhwigwaho dzo vha dzi tshi elana na S&T zwine zwa ita uri vhutshilo ha ḑuvha na ḑuvha vhu vhe na mutakalo, vhu leluwe, vhu vhe havhuḡi na u ita uri mushumo u takadze; ngeno mbilaelo khulwane yo tšogomelwaho yo vha i tshi khou amba nga ha S&T zwa ita uri nḡila yashu ya tshanduko ya vhutshilo i tšavhanye vhukuma na u shela mulenzhe kha u sa eḡana ho engedzeaho.

Phuluphedziso dza saintsi ya musalauno (phesenthe ya thendelano)



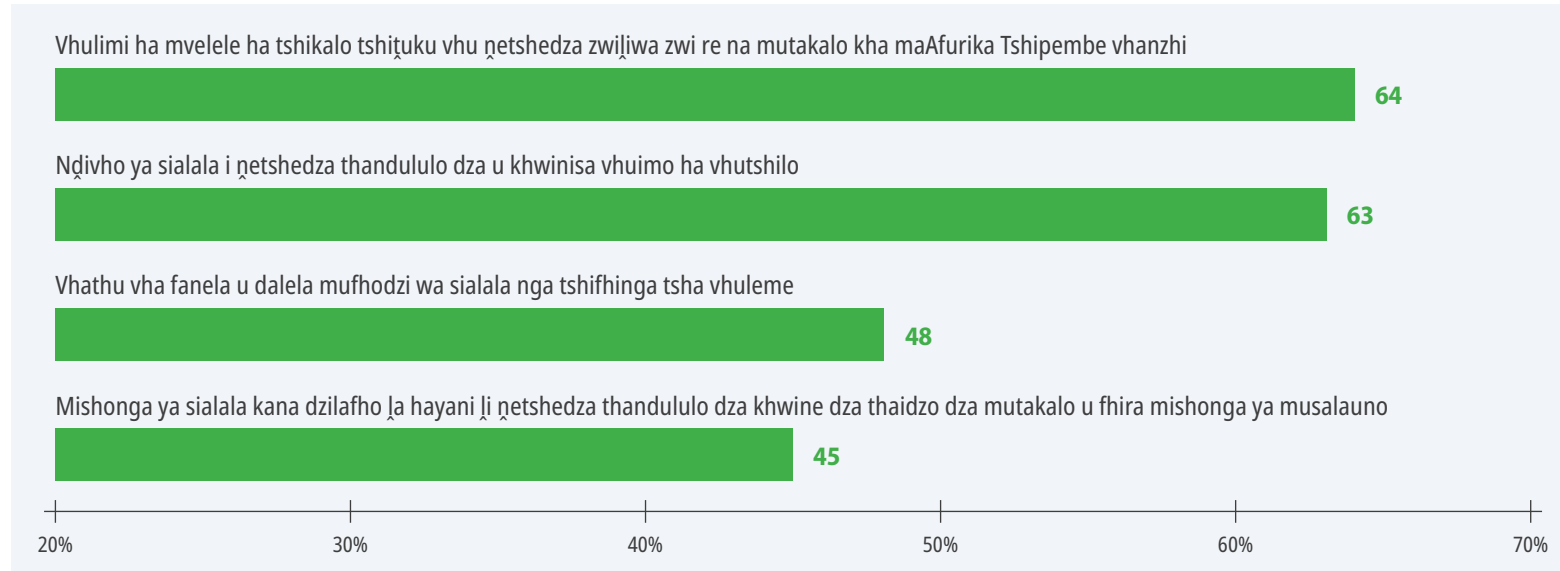
U vhulunga nga ha saintsi ya musalauno (Phesenthe ya thendelano)



6.2 Mavhonele na phuluphedziso na u vhulunga kha S&T ya mvelele

Saintsi ya mvelele i amba ndivho na vhukoni zwe zwa fhiriselwa kha murafho u ya kha murafho nga ngomu ha tshitshavha.

U fulufhedzisa ha saintsi ya mvelele (phesenthe ya thendelano)



Vhāvhiḽi kha vhahulwane vhararu

vho ṅanganedza mbuelo dza vhulimi ha mvelele ha zwikalo zwiṭuku na ṅdivho ya u bveledza zwiṭiwa

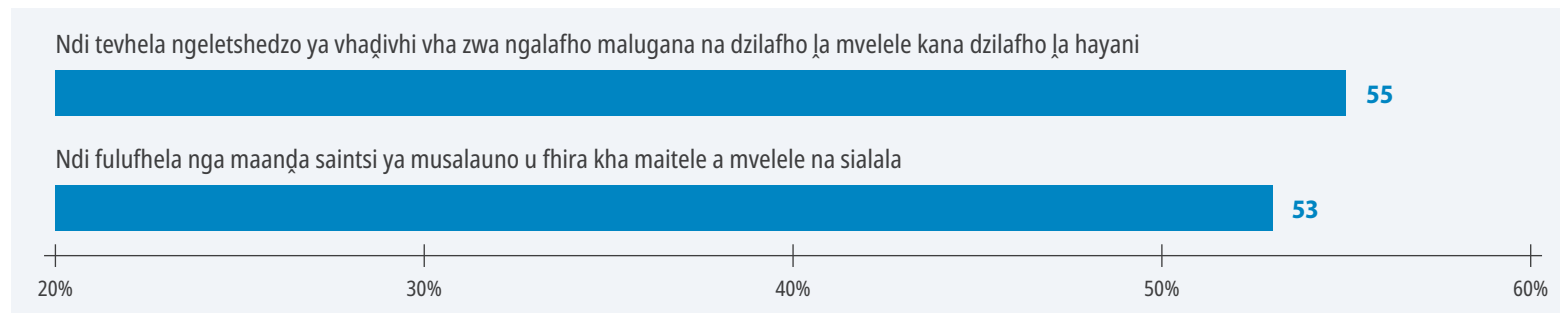


Vhaṭanu kha vhaaluwa vha fumi

vho ṅhogomela mushumo wa vhafhodzi vha mvelele na mishonga ya sialala

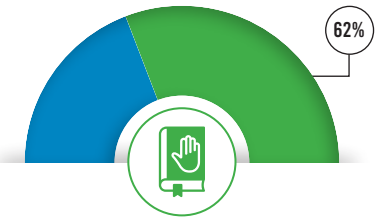
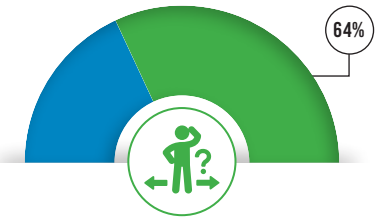
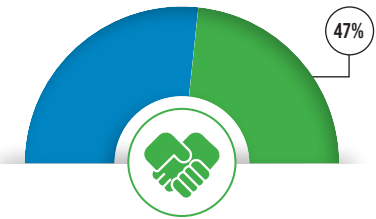


Mbetshelwa nga ha saintsi ya mvelele nga 2022 (phesenthe ya thendelano)



6.3 U kovhekanywa ha mavhonele a phuluphedziso na u vhulunga na vhe vha vha vhe na phuluphedziso dza nṅha na mavhonele a u vhulunga

Ho vha na phuluphedziso dza nṅhesa na mavhonele a u vhulunga kha saintsi ya musalauno u fhira kha saintsi ya mvelele. U engedza kha zwenezwo, ho vha na u fhambana huṅuku vhukati ha phuluphedziso dzaa tshitshavha na mavhonele a u vhulunga (sa zwe zwa sumbedzwa nga phambano vhukati ha zwikoro zwa nṅhesa na zwa fhasisa nga zwigwada zwiṅuku) malugana na saintsi ya musalauno u fhira kha saintsi ya mvelele.









	Phesenthe ya vhaalua vane vha vha na mavhonele a khwaṅhaho	Zwikoro zwa nṅhesa na fhasisa(na phambano)	Ndi vhafhio vhe vha vha vha tshi sumbedza u vhiga fulufhelo la nṅha na mavhonele a u vhulunga a nṅha?
Phuluphedziso u y akha saintsi ya tshizwino		62 to 72 = 10 phointsi	Vhaaluwa vhe vha vha vha na pfunzo dza u fhira dza phuraimari, ṅhuṅhewedzo ya nṅha u bva mahayani, nav he vha vha vha vhagidiswa kana vhagudi vhe vha vha vha na mavhonelee mahulwane a fulufhelo.
Mbulungelo u ya kha saintsi ya tshizino		64 to 76 = 12 phointsi	Vhaaluwa vhe vha vha vha na pfunzo dza u fhira dza phuraimari, ṅhuṅhewedzo ya nṅha u bva mahayani, vhe vha vha vha vhaṅuku, na vhaafurika vhatswu na maindia/ma asia vhahulwane vhe vha vha vha na mavhonele mahulwane a u vhulunga.
Phuluphedziso u ya kha saintsi ya sialala		49 to 70 = 21 phointsi	Vhaaluwa vhe vha vha vha na u swikelelela ha fhasi ha pfunzo, u bva miṅani I shayaho, vhahulwane vha maafurika vhatswu na vha ne vha amba Tshivenda, Tshizulu, Tshitsonga vho vhiga u vha na fulufhelo la nṅha kha sialala la S na T.

6.4 Nḡila dza u fulufhedzisa na mavhonele a u vhulunga nga murahu ha tshifhinga



Kha zwithu zwo vhwaho kha tsenguluso dza kale, ro vhambedza mvelelo na tsenguluso ya SAPRS ya 2022. Nga u angaredza, mvelelo dzo sumbedza u engedzea ha mavhonele a phuluphedziso na u vhulunga nga murahu ha tshifhinga kha saintsia ya musalauno, fhedzi u hanedza ha phuluphedziso na mavhonele a u vhulunga kha saintsia ya mvelele.

Tshanduko khulwane yo vha i nḡila ine lushaka lwa dzhia ngayo u sa eḡana ha u gonya ha phindulo dza tshitatamennde tsha 'Mvelaphanḡa ya saintsia i anzela u vhuedza vhapfumi u fhira vha shayaho' zwine zwa engedzea nga phesenthe dza 17. Ho vha na u fhungudzea hu vhonehalo kha tshivhalo tsha tshitshavha tshe tsha tendelana uri S&T i ḡo sika zwikhala zwinzhi kha mirafho i ḡaho. Naho zwi tshi takadza u ḡhogomela uri zwinzhi zwa lushaka zwino zwi na fulufhelo ḡihulwane kha saintsia ya musalauno na maitete a mvelele na sialala, hu na mbilaelo ya uri kuvhonele kwavho kha fulufhelo ḡa u lima zwiḡuku zwo fhungudzea.

NB: Zwithu zwidala zwo ḡaniwaho zwo vhwigwa u engedzea ha ndeme ha zwiatamennde kha zwiwhoni u bva nga 2013 u swika nga 2022, zwithu zwo ḡaniwaho nga muvhala wa tshitopana zwo tshenzhela hu si na tshanduko dza ndeme dza zwiatamennde, ngeno vhenevho vha muvhala wa swiri wo ḡaniwaho wo vhwiga u fhungudzea ha ndeme ha zwiatamennde kha mavhonele.

Saintsia ya musalauno: Tshanduko u bva nga 2013 u swika nga 2022 (Phesenthe dza phointsia)		
Mvelaphanḡa ya saintsia i anzela u vhuedza vhapfumi u fhira vha shayaho (R)		+17***
Ri ḡitika nga maanḡa nga saintsia nahone a ro ngo eḡana kha lutendo kana vhurerele (R)		+7***
S&T i ita uri nḡila yashu ya vhutshilo i shandule nga u ḡavhanya (R)		+5***
Mbuyelo dza S&T ndi khulwane u fhira mvelelo dzi vhaisho (P)		+9***
S&T i ḡo ita uri mushumo u takadze (P)		+7***
S&T i khou ita uri vhutshilo hashu vhu vhe na mutakalo, vhu leluwe, na u ḡifara zwavhuḡi (P)		0
S & T ndi mishumo yo teaho ya vhafumakadzi (P)		-2
S&T i ḡo sika zwikhala zwinzhi zwa mirafho i ḡaho (P)		-11***

Notsi: *** zwine zwa vha zwa ndeme nga zwiatamennde kha $p < .001$

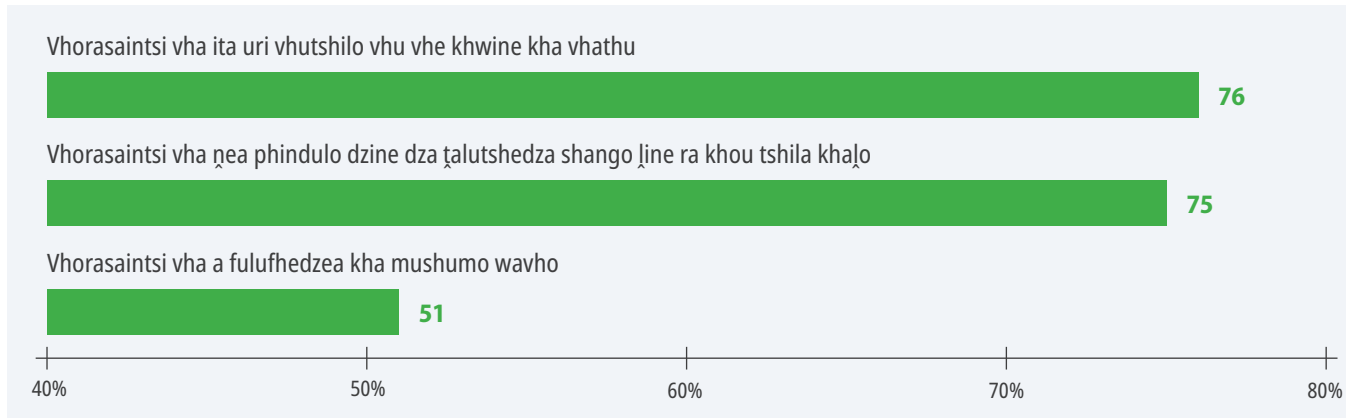
Saintsia ya mvelele: Tshanduko u bva nga 2009 u swika nga 2022 (Phesenthe dza phointsia)		
Vhulimi ha mvelele ha tshikalo tshiḡuku vhu ḡetshedza zwiḡiwa zwi re na mutakalo kha maAfurika Tshipembe (P)		-7***
Ndi fulufhela nga maanḡa saintsia ya musalauno u fhira kha maitete a mvelele na sialala (R)		-18***

Notsi: *** zwine zwa vha zwa ndeme nga zwiatamennde kha $p < .001$

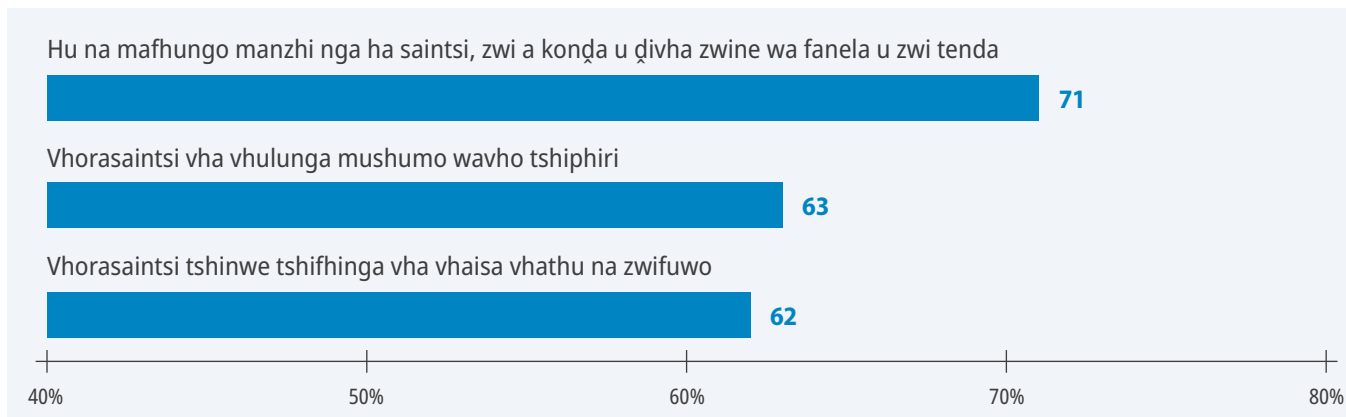
7

Fulufhelo la lushaka kha mushumo wa vho rasaintsi na mafungo a saintsi u bva kha zwiimiswa

Phuluphedziso dza mushumo wa vhorasaintsi (Phesenthe ya thendelano)



U vhulunga nga ha mushumo wa vhorasaintsi (Phesenthe ya thendelano)



Saintsi na vhorasaintsi vha ḡea mafungo o thewaho kha vhuḡanzi na nyeletshedzo nga ha ḡḡila ya u tandulula thaidzo dza tshitshavha. U itela uri nyeletshedzo i ḡanganedzee, tshitshavha tshi tea u fulufhela saintsi na vhorasaintsi, khathihi na u vha na fulufhelo kha zwiimiswa zwine zwa bvedza ḡḡivho yo raloho. 7 kha vhatu vhanzhi vha 10 vho vha vha tshi fulufhela mushumo wa vhorasaintsi, khathihi na mafungo a S&T o ḡetshedzwaho nga dziyunivesithi na madzangano a ḡḡḡisiso.

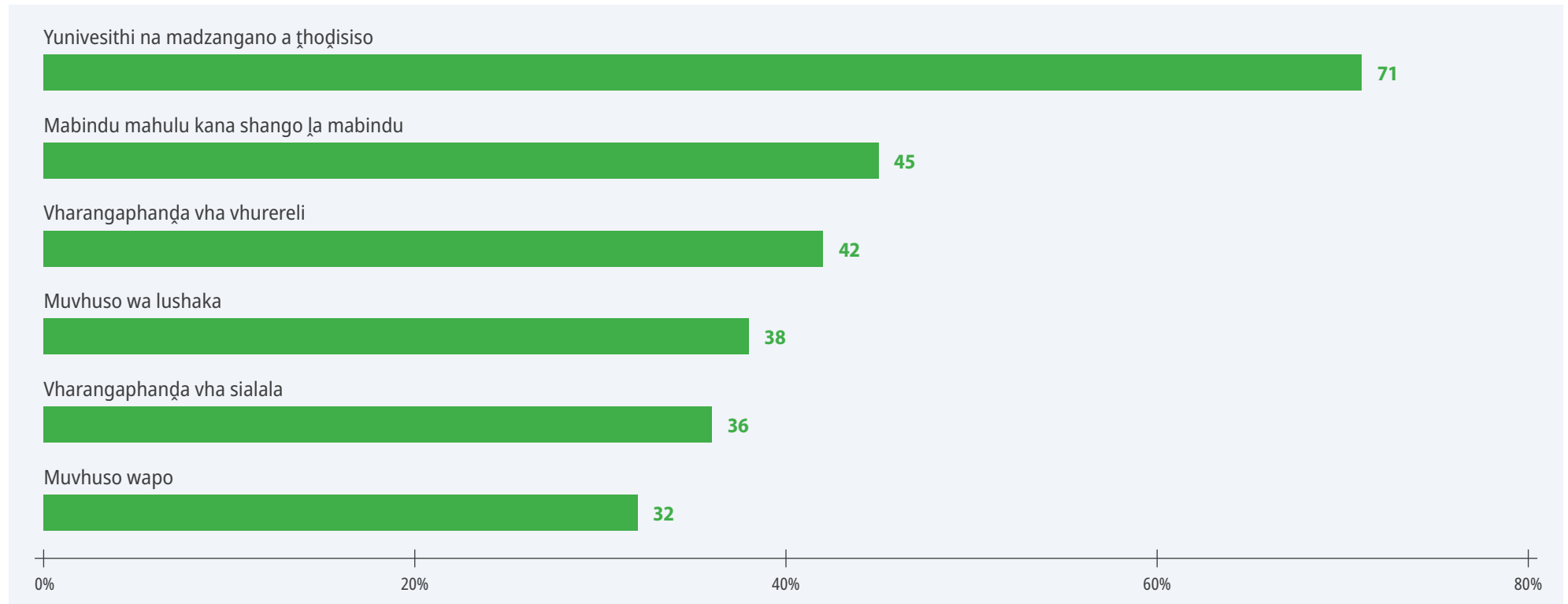


Vha sumbe kha vhahulwane

vha fumi vho vha vha tshi fulufhela mushumo wa vhorasaintsi, khathihi na mafungo a S&T o ḡetshedzwaho nga dziyunivesithi na madzangano a ḡḡḡisiso

Nga tshifhinga tshithihi, naho zwo ralo, phesenthe khulwane ya lushaka yo vha i na dzulo nga ha mushumo wa vhorasaintsi khathihi na u fulufhela zwiḡuku kha mafungo a S&T u bva kha vharangaphanḡa vha vhurereli na zwiimiswa zwa muvhuso (vhona siaḡari ḡi tevhelaho).

Fulufhelo kha mafhungo a S&T u bva kha zwiimiswa zwo fhambanaho (phesenthe ya thendelano)



Ndi nnyi we a vha e na fulufhelo jihulwane kha vhorasantsi na mafhungo a S&T u bva kha dziyunivesithi na madzangano a t̥hoḍisiso?

Lushaka lwo vha lu na mavhonele a fanaho, hu sa londwi u fhambana ha matshilisano na demogirafi, kha u fulufhela havho mushumo wa vhorasantsi na u fulufhela mafhungo a S&T u bva kha dziyunivesithi na madzangano a t̥hoḍisiso.

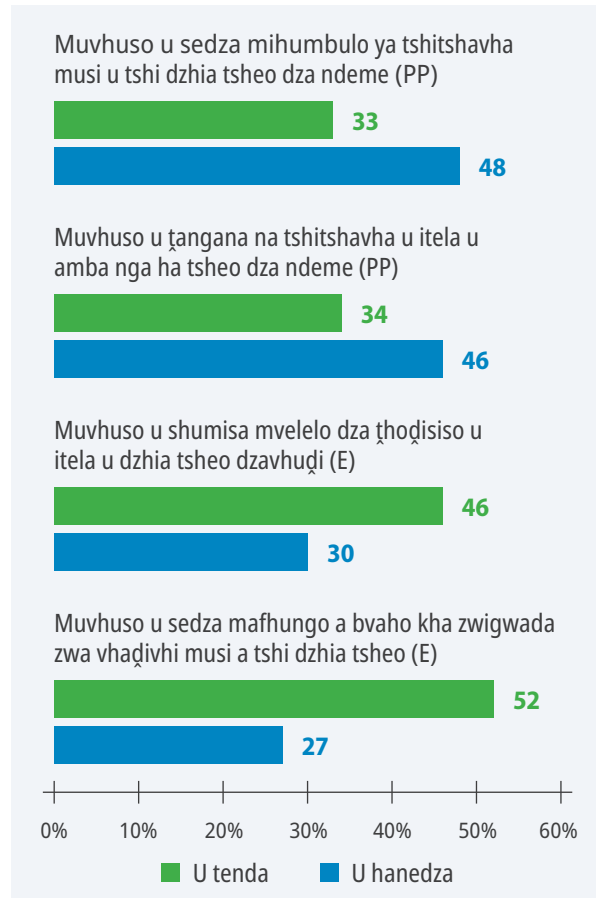
Vhane vha vha na fulufhelo jihulwane kha vhorasantsi na kha mafhungo a S&T u bva kha dziyunivesithi na madzangano a t̥hoḍisiso vho vha vhe:

- vhaaluwa vha re na pfunzo ya n̥ṭha,
- vhaaluwa vha re na thikhedzo ya pfunzo ya n̥ṭha ya hayani,
- muṭuku, na
- vhagudiswa na vhagudi.

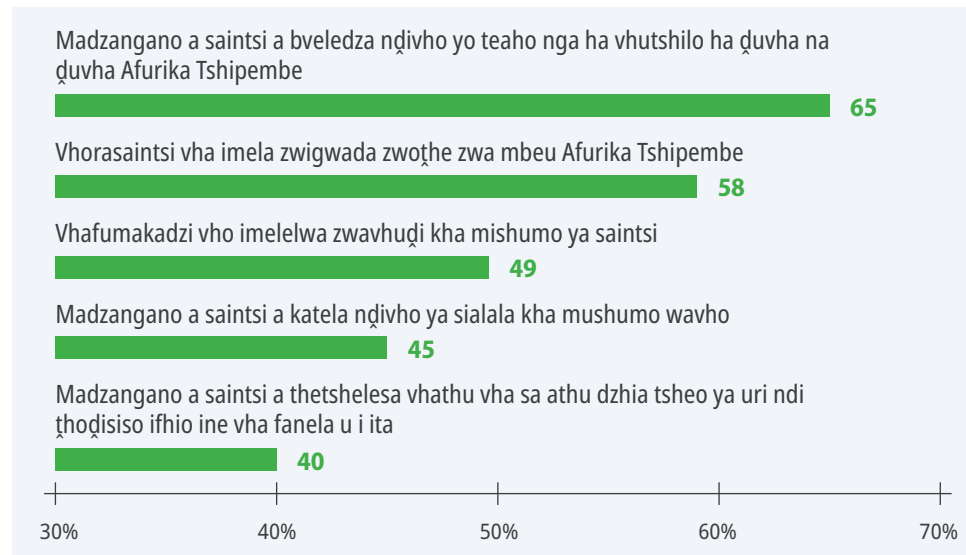
8

Fulufhelo la tshitshavha kha maitele a muvhuso a u dzhia tsheo na tshanduko ya mvelele nga ngomu ha madzangano a saintsi

Fulufhelo kha maitele a muvhuso o tewaho kha vhuṭanzi (E) na u dzhia tsheo dza u shela mulenzhe (PP) (phesenthe ya thendelano na u sa tendelana)



Mvelele nga ngomu ha madzangano a saintsi dzi khou shandukisa (phesenthe ya thendelano)



Vhararu kha vhaaluwa vha fumi

vhaṅwe na vhaṅwe vho vhiga fulufhelo juhulwane kha nḍila ya u dzhia tsheo ya muvhuso



Vhaṅa kha vhaaluwa vha fumi

vho tenda uri dzimvelele dzau ṭandavhuwa nga ngomu ha madzangano a saintsi

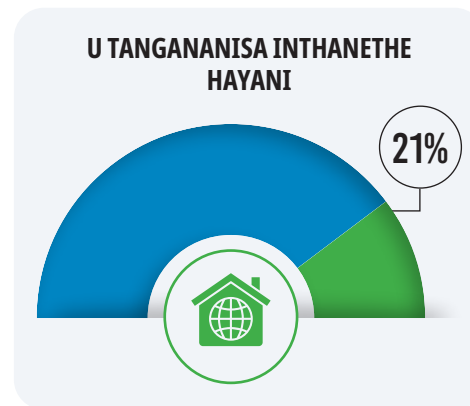
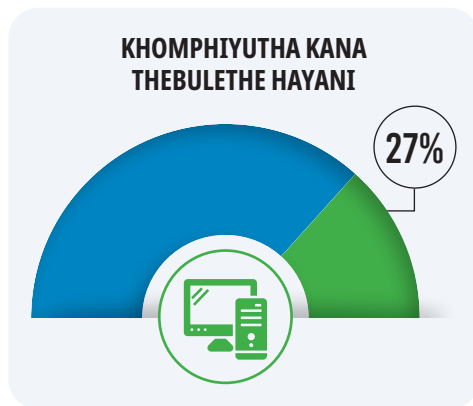
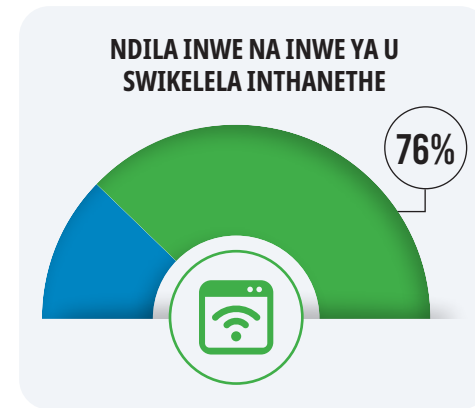
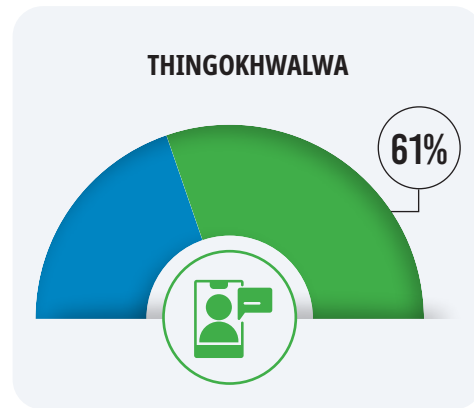
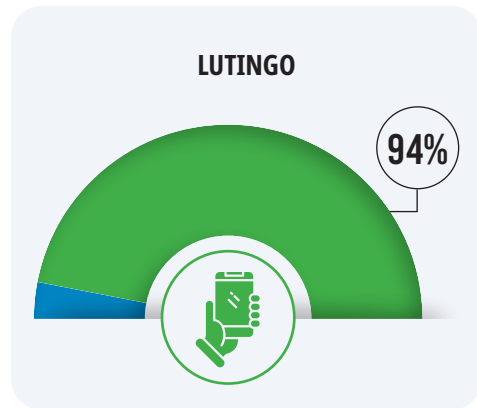


- Ho vha hu na fulufhelo liṭuku kha maitele a u dzhia tsheo a muvhuso na u shandukiswa ha mvelele nga ngomu ha madzangano a saintsi.
- Phambano vhukati ha zwikoro zwa nṭhesa na zwa fhasisa, nga tshigwada tshṭuku, tsha u fulufhela maitele a u dzhia tsheo a muvhuso zwo vha zwi phoindi ṭhukhu dza 11; ngeno phambano ya thendelano ya uri mvelele kha zwiimiswa zwa saintsi dzi khou shanduka dzo vha dzi 8 points.
- MaAfurika Tshipembe vha anzela u ṭanganedza mihumbulo i fanaho kha u dzhia tsheo dza muvhuso na u shandukiswa ha mvelele kha fhethu ha mushumo ha saintsi, hu sa londwi vhubvo havho ho fhambanaho.
- Vhaaluwa vha vharema vha Afurika vho vha vhe na fulufhelo juhulwane kha maitele a u dzhia tsheo a muvhuso na thendelano ya nṭhesa nga ha tshanduko dza mvelele nga ngomu ha madzangano a saintsi.

9 Mafhungo a S na T: U swikelela, U andalala, U dzhia, Na u fulufhela

Vhushaka ha vhudi vhukati ha Saints na lushaka zwi bva kha u neana ha mafhungo a S na T na u khwathisedza uri vha lushaka vha nga swikelela na u fulufhela kha mafhungo aya. U swikelela ha lushaka kha zwishumiswa zwa muyani na inthanethe i tamba sa tshipida tsha ndeme kha uri vha swikelele mafhungo aya.

Nga ñwaha wa 2022, hohu u swikelelwa ha didzhithaĵa na inthanethe zwo vha nga nĵila i tevhelaho:



Vhararu kha vhathu vhaĵa

vho vha na u swikelela tshu muyani



Vha rathu kha vhathu vha fumi

vho vha na thingokhwalwa



9.1 Ndila ya uswikelela inthanethe na u shumisa

Muthihi kha
vhahulwane
vhana avha



ngo swikelela
inthanethe

Muthihi kha
vhahulwane vhararu



vho dzulela u shumisa
inthanethe (U fhirisa awara
nna kha maduvha manzhi)

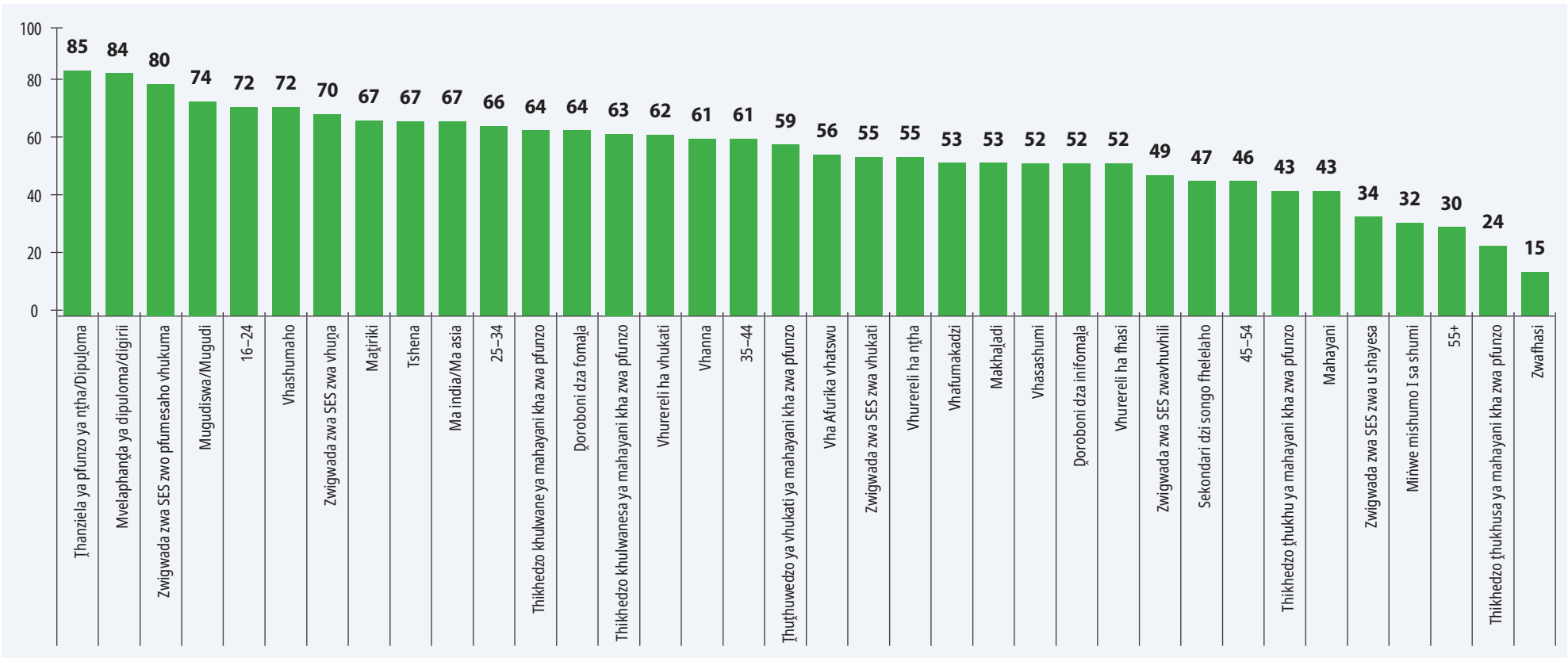
Ku shumisele kwa inthanethe lwa duvha zwo fhambana ngau angalala, U bva ntha kha phesenthe ya fumalo thanu kha vhala vhane vha vha magudedzini a pfunzo dza ntha uya fhasi kha phesenthe dza fumi thanu kha vhala vhare kha pfunzo dza fhasii.

Ndi nnyi we a shumisa inthanethe lwa ntha?

Vhe vha vha vho shumisa inthanethe lwa ntha a si a vha:

- Vhahulwane vhane vho swikelela pfunzo dza matiriki uya ntha, na vhare na thuthuwedzo kha pfunzo dza ntha hayani
- Vhatuku,
- Vhagudiswa, Vhagudiswa, Na vho tholiwaho
- U bva kha mahaya a SES o pfumaho, na
- Vhatshena na ma india/ma ezhia vhahulwane

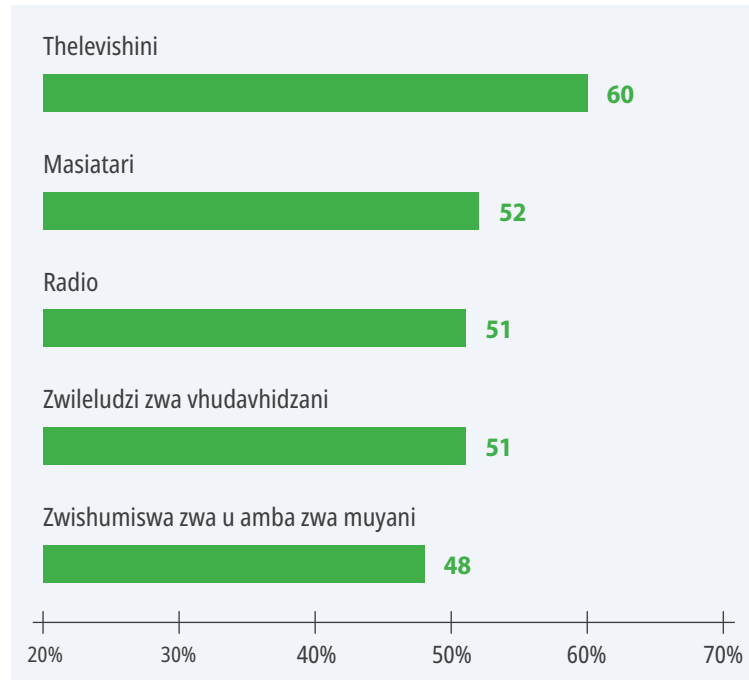
Ndila yaku shumisele kha inthanethe nga vha zwivhumbeo zwa matshilisano zwa demografiri (%)



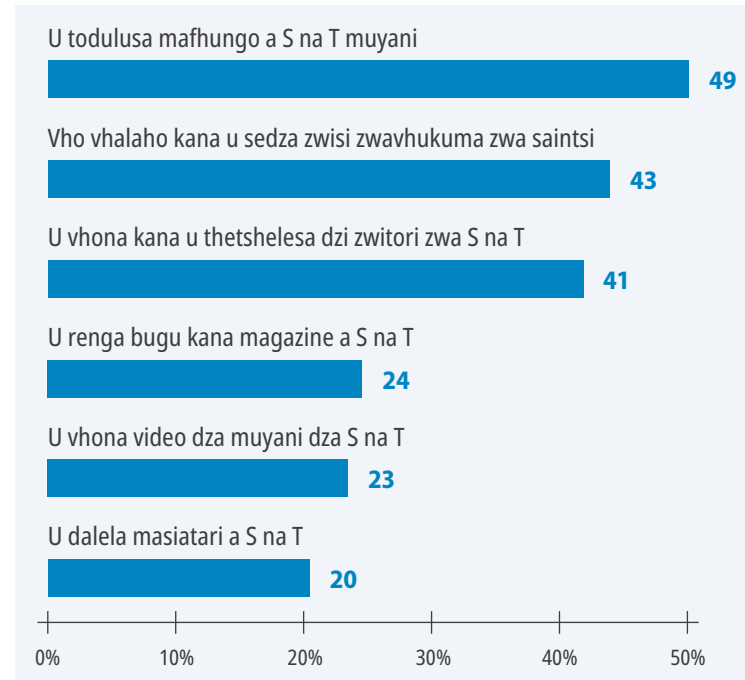
9.2 U angalala ha na u dzhia ha S na T information

Mafhungo ndi ndila ya u dzhia tsheo zwine zwa nga fhedzisela zwo tutuwedza ndila na vhudifari. Lushaka lwo vhiga uri lwo angaladziwa kha (u tangedza) na u dzhia (u swikelela lwo khwathaho) tshivhalo tsha fhasi tsha mafhungo a S na T.

Zwiko zwi divhaleesaho zwa mafhungo a S na T (phesenthe lutuku kha vhege)



Ndila dzi divhaleesaho dza mafhungo a S na T o shumisiwaho (phesenthe thukhu tshinwe tshifhinga)



Vha vhili kha vhaaluwa vha fumi

vho tangedza tshivhalo tshivhalo tsha S na T



Muthihi kha vhahulwane vha fumi

o dzhia zwi vhalo zwinzhi zwa S na T



ZWIKO ZWI DIVHALESAAHO ZWA MAFHUNGO A S NA T

Thelevishini

60%



NDILA I DIVHALESAAHO YA U SWIKELELA LWO KHWATHAHO LWA MAFHUNGO A S NA T

Thoduluso dza muyani

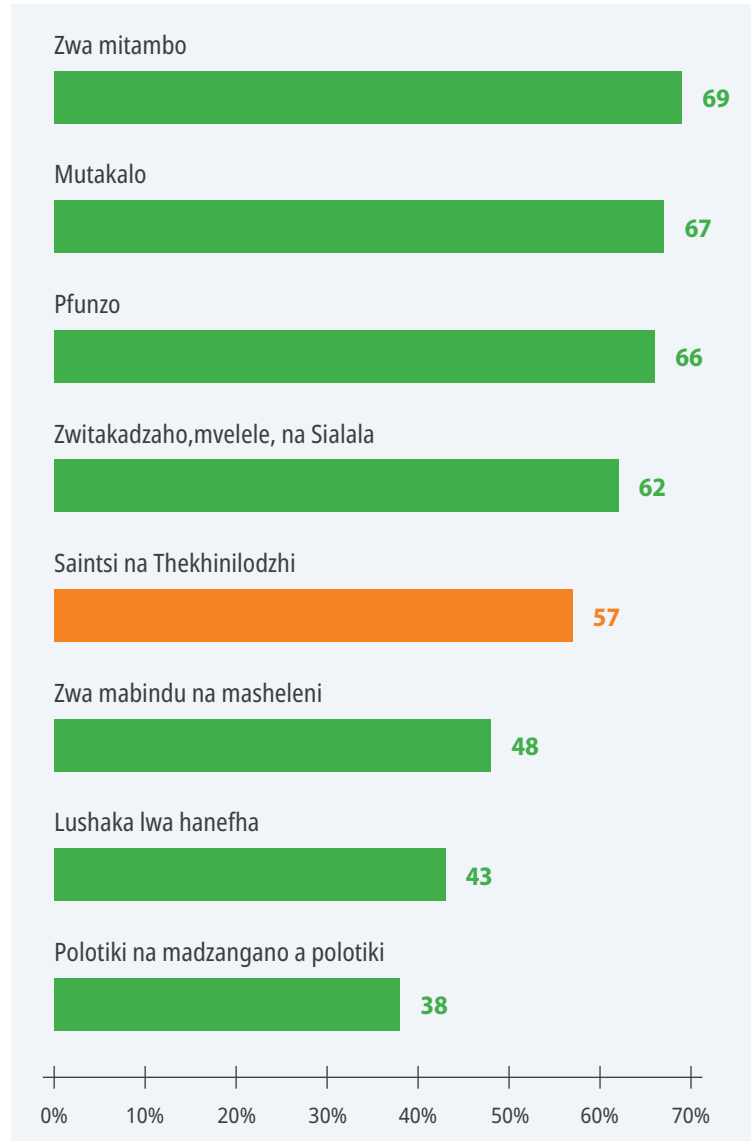
49%



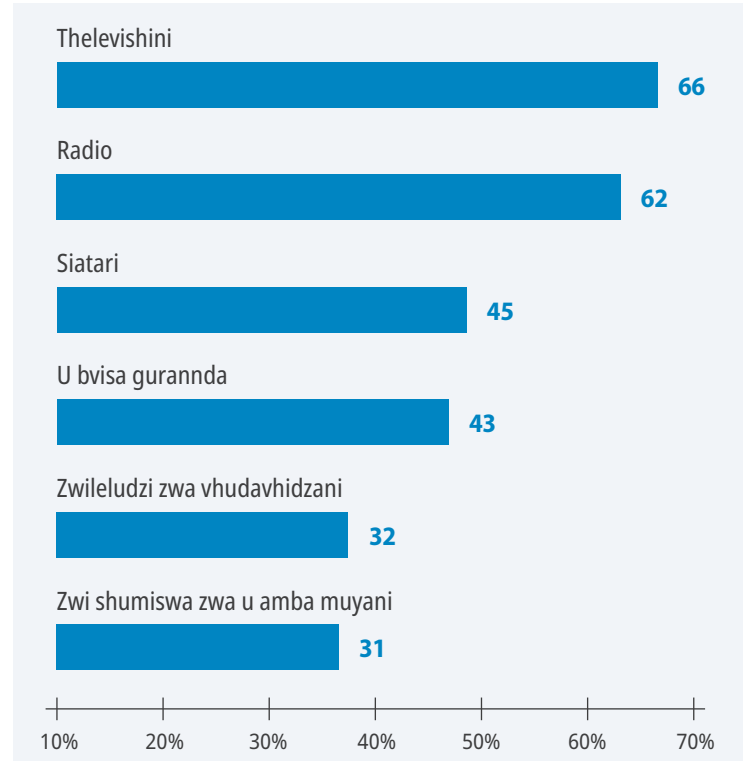
- Hovha na zwikoro zwi hulu zow fhambananaho nga u angalala kha u dzhia ha mafhungo a S na T nga zwigwada zwituku, na zwikoro zwi tshi bva kha fumbilimbili uya kha futhanu nthihi kha tshivhalo tsha dana tshe tsha vha tsho andalala kha mafhungo, na vha fumbili sumbe uya kha fu ina sumbe vho dzhiaho mafhungo.
- Vhe vha vha vho andadzwa kha, na u dzhia, mafhungo a S na T manzhi:
 - Vho vha na u swikelela pfunzo dza ntha,
 - Vho vha na thikhedzo ya ntha ya pfunzo I bvaho hayani
 - Vho vha vha vhatuku, vhagudi, na vhagudi.

9.3 Fulufhelo kha mafungo are ngomu na zwiko zwa mafungo

Fulufhelo kha mafungo are ngomu (phesenthe)



Fulufhelo kha zwiko zwa mafungo a S na T (Phesenthe)



- Naho vhubvo havho ho angalala, Vhadzulapo vha Afurika Tshipembe vhovha na levele dzi fanaho dza fulufhelo kha zwiko zwa mafungo a S na T.
- Vhe vha vha vha na fulufhelo lihulu kha zwiko zwa mafungo a S na T vho vha vha vha hulwane vha re na pfunzo nnzhi, thuthuwedzo khulu ya pfunzo I bvaho hayani, na avho vhe vha vha vha vhatuku, vhagudiswa, vhagudi, na vha sina mishumo.

Vharathi kha vhaaluwa vha fumi

vho vha vho fushea nga ndila ine media yo divhadza mafungo a S na T



NDILA KHULWANE YA FULUFHELO KHA MAFUNGO ARE NGOMU

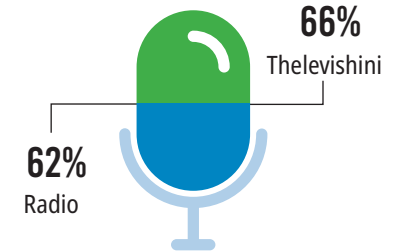
Zwa mitambo

69%



ZWIKO ZWA S NA T ZWIFULUFHEDZEHAO

Thelevishini na radio



10 Mvelelo dza u dzhenelela ha saints: Mishumo na vhuḡifari

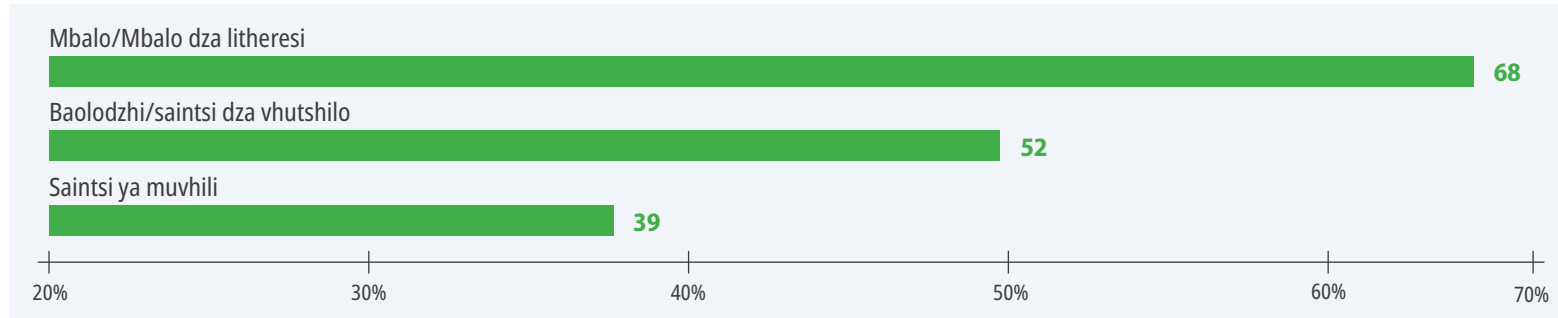
Vhafhinduli vha tsenguluso vho vhudziswa arali vho shela mulenzhe kha mishumo yo fhambanaho i tshimbilelanaho na S&T kana zwiitea, sa izwi u ita ngauralo zwi tshi shuma sa ṅḡila ya u sumbedza vhuḡifari havho ha u dzhenelela ha saints. Mishumo kana zwiitea zwo khethekanywa zwa vha tshaka ṅhanu dzo ṅandavhuwaho dza vhuḡwamani: u ḡi dzhenisa kha zwa pfunzo, u ṅanganelana ho ḡi dzhenisa kha u kunga, u ḡi dzhenisa ho tewaho kha tshitshavha, u ḡi dzhenisa kha u ṅea ha mafhungo, na u ḡi dzhenisa ha muthu nga eṅhe na zwishumiswa zwa muyani.



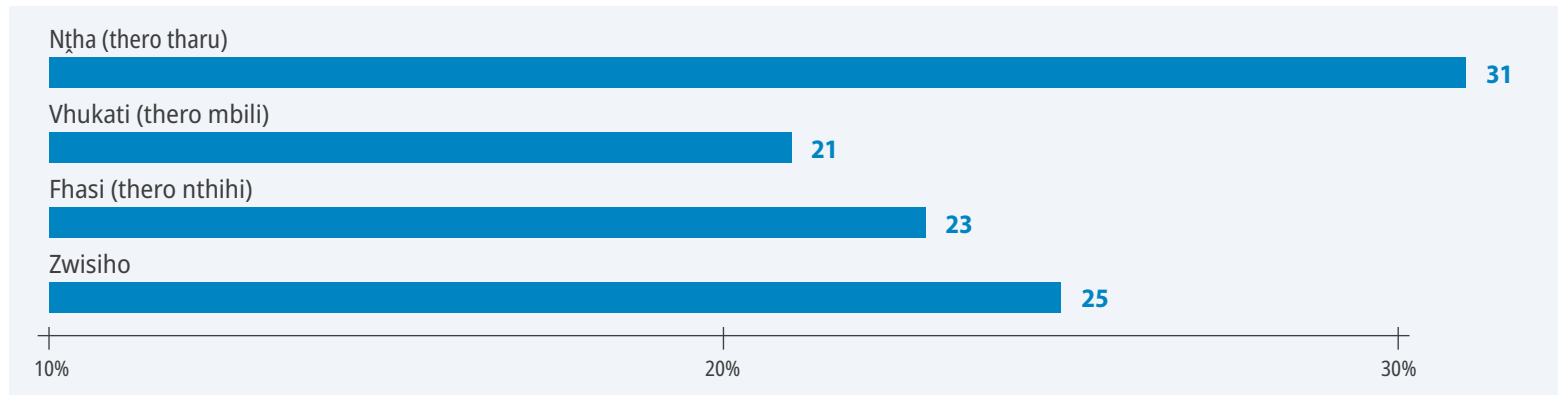
10.1 U di dzhenisa kha zwa pfunzo: Ndila ya u țangana kha matavhi a dzi thero tshikoloni

Ngdivho ya saintsi na maitetele u yakha saintsi zwi na vhushaka. Vha u fhiindula țhođisiso ya SAPRS vho vhiga kha matavhi a thero dze vha vha vho dzi nğanga u dzi guda tshikoloni kha mirele ya nğha ha wa vhuțhe.

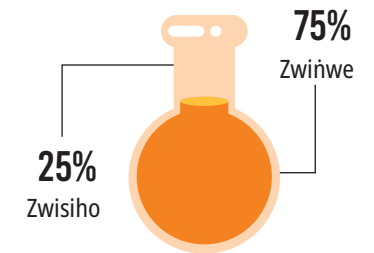
U țangana kha matavhi a thero dza u fhisa murole wa țahe (phesenthe)



U țangana ha matavhi kha mutevhe (phesenthe)



U di dzhenisa kha matavhi mañwe na mañwe a thero nga murahu ha murole wa vhuțahe



Vhararu kha vhañwane vha fumi vhañwe na vhañwe

vho vha na u di dzhenisa ha nğha kha matavhi, vho dzhia matavhi a thero dzoțhe dzo vhudziswa nga murahu ha murole wa vhuțahe







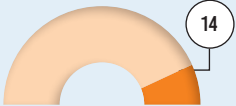










Vhane vha vha na țhanganelano ya matavhi a nğha:

- Vhovha na ndila ya nğha ya u swikelela pfunzo na thikhedzo ya nğha ya pfunzo ya mahayani.
- Vho bva mahaya ni a nğha a SES,
- Vho vha vha vhațuku, vhagudiswa, vhagudi, na vhashumi, na
- Vho vha vho tewa u vha vhañwane vha vhatshena.

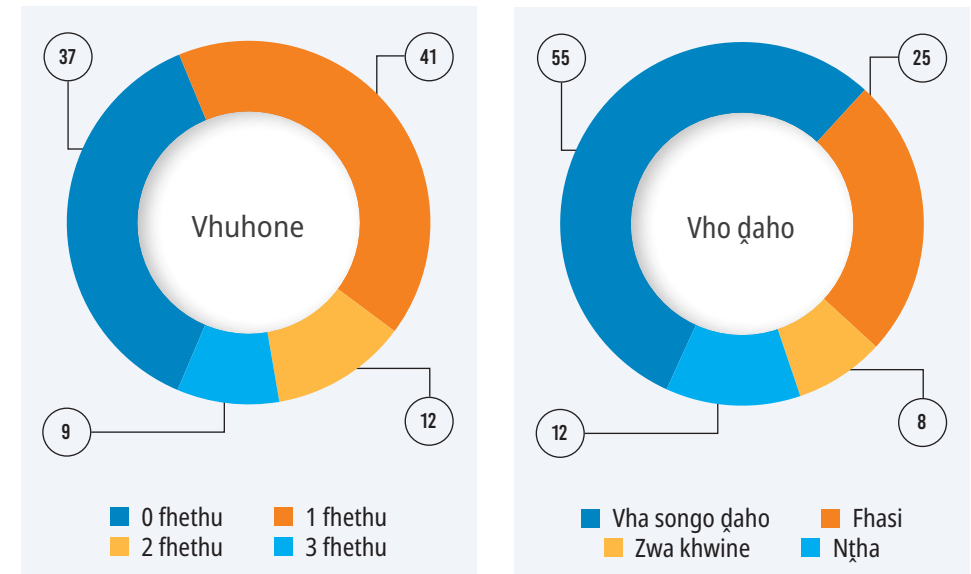
10.2 U tlanganelana ho di dzhenisa kha u kunga: U vha hone ha na u ya kha fhethu ha S na T

Vha u fhindula kha tshoduluso dza SAPRS kha u vha hone ha S na T na Tshumelo vhuwani havho na u ri vho vha dalela na. Fhedzi muthihi wa vhararu vha lushaka (phesenthe dza furaru sumbe) a vho ngovha na fhethu ha S na, vhunga ha u vhalela, muziamu kana senthara tsini na mahaya avho, musi vhare nṅha ha vhukati (phesenthe dza fuṅhanuṅhanu) avhango ya kha fhethu ha S na T kana zwiitwani.

U vha hone ha na u ya kha fhethu ha S na T na mishumo (phesenthe)

	Fhethu ha S na T na Mishumo	Vhupo hu re hone	Vho ḡaho
	Ha u vhalela ha lushaka	 55	 30
	Zwiitwa zwa sainsti zwa lushaka, tsumbo. U kulumaga, u tshimbila muponi	 14	 18
	Muziamu	 12	 23
	Ngade dza u ḡi mvumvusa, mupo kana ha mitambo, ha dziphukha, ha zwaḡini	 10	 26
	Fhethu ha Sainsti na Thekhinoḡodzhi kana ha Miḡano	 7	 16

U vha hone ha na u ya kha fhethu ha S na T na mishumo (phesenthe)

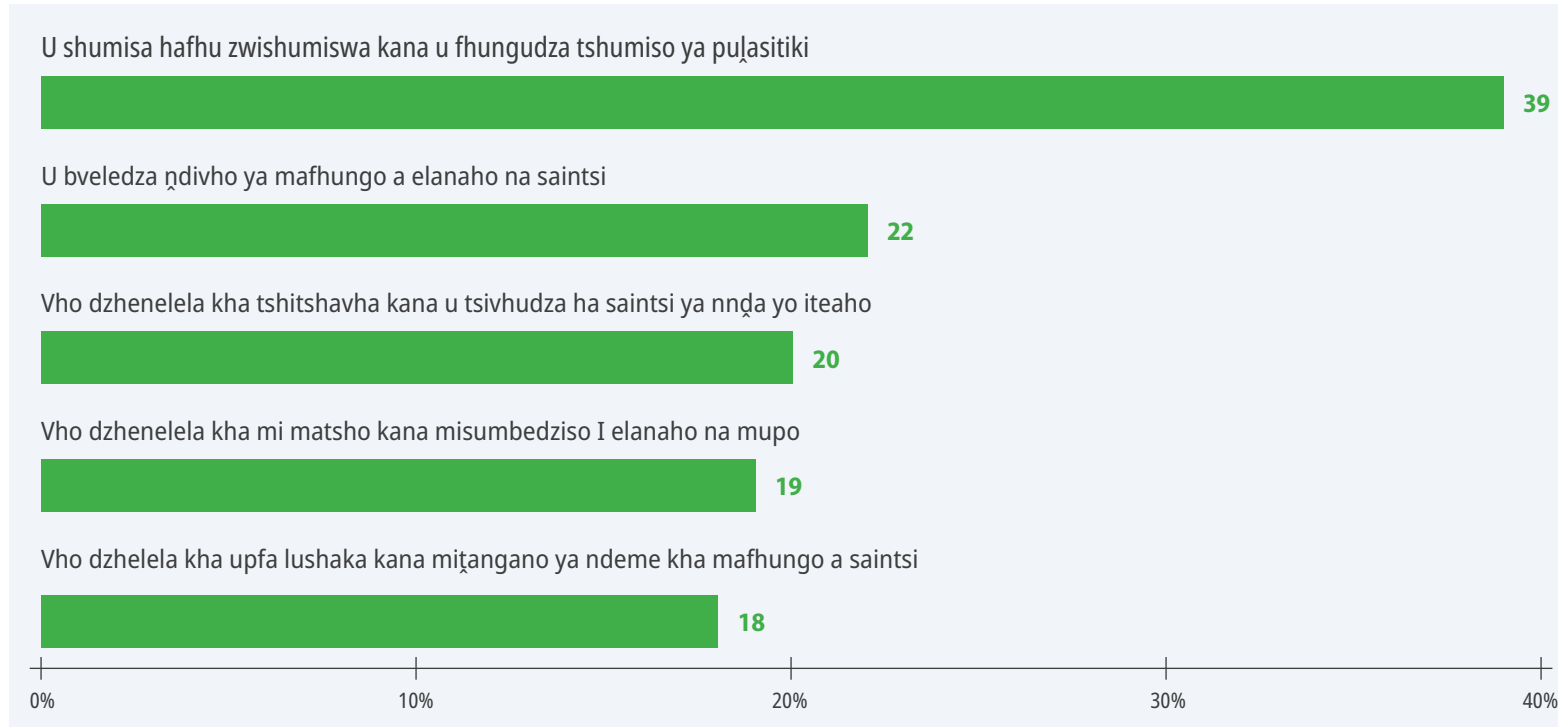


Vhe vha vha vho lavhelelwa u ya kha zwiitwa na zwiitea:

- Vho swikelela pfunzo dza matiriki na nṅha, na tshuṅhuedzo yz pfunzo ya nṅha mahayani,
- Vha bva mahayani a nṅha a SES,
- vho dzula mahayani a vhudi na fhethu vhupo hu si ha vhuḡi,
- vho vha vha tshi shuma, vhagudiswa, na vhagudi,
- vho dzula tshini na fhethu ha S na T,
- vho vha vho ṅanea kha na u dzhia mafhungo manzhi a S na T.

10.3 U di dzhenisa ho tewaho ha tshitshavha

Vho dzhenelelaho kha u di dzhenisa kha zwiitwa zwo tewaho kha tshitshavha (phesenthe dza fhasisa mañwe maḍuvha)



Muthihi kha vhahulwane vha sumbe vho vhiga

uri mishumo ya saints ya lushaka i ngaho u kunakisa tshitshavha na u tshimbila nga mvelo zwo vha zwi tshi wanala vhuponi havho



Muthihi kha vhaaluwa vha fumi

vho vha vha tshi dzulela u shela mulenzhe kha mishumo yo tewaho kha tshitshavha



NYITO YO NO DIVHALEESA KHA TSHITSHAVHA

U shumisa hafhu zwishumiswa kana u fhungudza u shumisa mapuḷasitiki



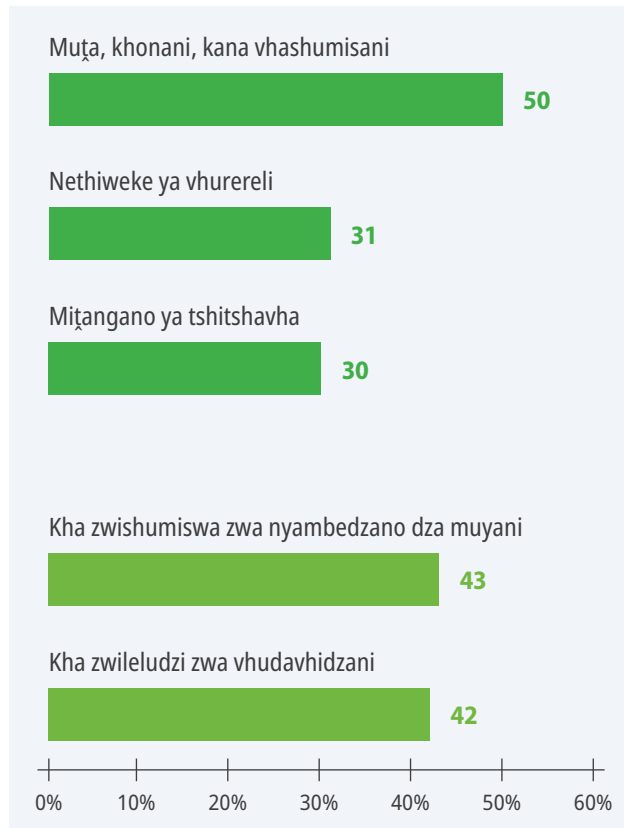
Ndi nnyi we a vha na u shela mulenzhe ha nḡa kha u ḡanganelana ha tshitshavha?

- Phambano kha zwiworo zwa vhukati, nga zwiḡwada zwiḡuku, yo vha i vhuphara ha 8 u swika kha 33.
- Vhane vha nga vha na u shela mulenzhe ha nḡhesa kha u ḡanganelana ha saints ho thewaho kha tshitshavha vho vha vhe:
 - vhaaluwa vha re na pfunzo ya maḡiriki na u ya nḡa,
 - mushumo, matshudeni, na vhagudi, na
 - vhane vha dzula fhethu hu si ha fomala na ha fomala ha ḡoroboni.

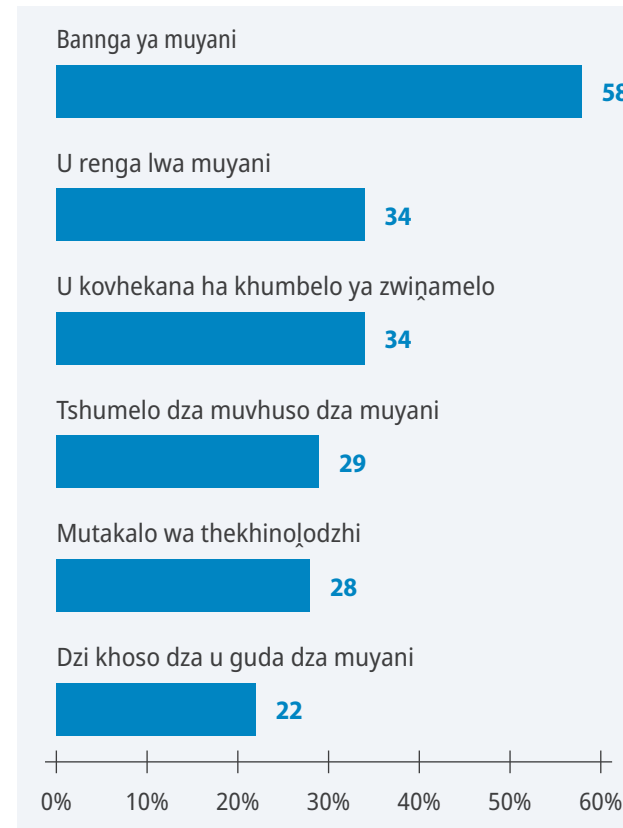
10.4 U t̄anganelana ha u ̄nea mafhungo na u t̄anganelana na zwishumiswa zwa muyani

Nga n̄nda ha u wana mafhungo a S&T, lushaka lwo ̄nea mafhungo, khathihi na u shumisa zwishumiswa zwa muyani. Ho vha hu na zwikalo zwa fhasi zwa u kovhelana mafhungo, khathihi na u shumisa zwishumiswa zwa muyani vhukati ha lushaka. Lushaka lwo kovhekana mafhungo a S&T kanzhi kha muṭa, khonani, kana vhashumisani; nahone tshishumiswa tsha muyani tshe tsha vha tshi tshi shumiswa lunzhi vhukuma yo vha i ya u bannga ya muyani.

u kovhelana mafhungo: hani na nnyi (phesenthe tshīnwe tshifhinga)



U shumiswa ha zwi shumiswa zwa muyani zwo n̄angiwaho



Vhāvhi ka vhaaluwa vha fumi vho

̄nea mafhungo na u shumisa zwishumiswa zwa muyani lwo vhalaho



- Ho vha hu na zwikoro zwiḥulwane zwo angalalaho, zwigwada zwiṭuku, u ̄nea mafhungo u bva kha 18 uya kha 46, na u shumiswa ha zwishumiswa zwa muyani u bva kha 11 uya kha 56, zwoṭhe zwi kho swika kha 100.
- A vho vhe ha kovhekana mafhungo manzhi na u vhiga u shumisa ha zwishumiswa zwa muyani ha nṭha vho vha vho lavhelelwa u vha:
 - Vho vha vho swikelela pfunzo dza nṭha na ṭhuthuwedzo khulwane ya pfunzo u bva mahayani,
 - Vha na SES ya nṭha,
 - Vha vhe vhaṭuku, vha tshi shuma, vhagudiswa, na vhagudi, na,
 - U dzula kha vhupo ha mahayani ha fomaḷa na inifomaḷa.
- Vha aluwa vhatswu vha maafurika vho vha vha tshi laavhelelwa u kovha mafhungo, musi vha india/vha asia na vhatshena vhaḥulwane vha tshiya u vhiga u shumiswa ha nṭha ha u n̄angiwa ha zwishumiswa zwa muyani.

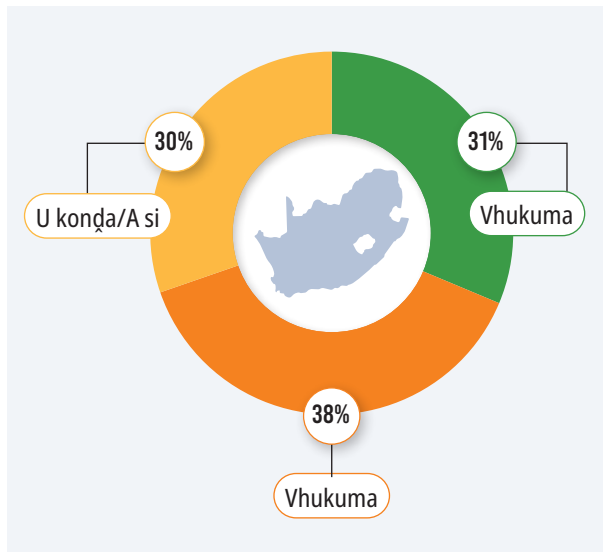
11

U dzhiela nzhele kha u di rwa khana, phuluphedziso, na vhundeme nga ha sisiteme ya tshitshavha ya vhubveledzi

11.1 U di rwa khana kha mvelelo dza S&T na Afurika Tshipembe

Tshitshavha tshine tsha qivha saintsi tshi tikedzwa nga u dzhiela nzhele ha zwine zwa tšanganedza na u tikedza sisiteme ya lushaka ya vhubveledzi. Naho vhaaluwa vha sumbe kha vha fumi vho vha vhe vhane vha vha na 'vhukuma' kana 'vha' qihudzaho nga zwine vha zwi swikelela kha S&T ya Afurika Tshipembe, vho vha vha tshi qivhea nga ha zwe zwa swikelela musi vha tshi vhambedzwa na mañwe madzingu a jifhasi, hu na kotara nthi fhedzi vha tshi tendelana uri Afurika Tshipembe lo vha li khwine u fhira Yuropa na Devhula ha Amerika.

Ni dirwa khana zwingafhani nga mvelelo dza S&T na Afurika Tshipembe



Ndila ine mvelelo dza S&T dza Afurika Tshipembe dza tumana ngayo na mañwe madzingu a shango?

Afurika tshipembe I khine kha...		Phesenthe ya thendelano
	Mañwe mashango a Afurika	67%
	Yuropa na devhula ha Amerika	25%
	Mashango a Asia	18%

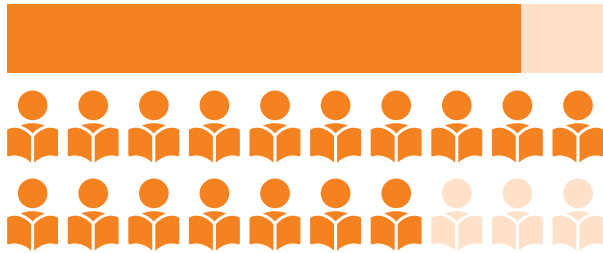
- Zwikoro zwa vhukati, nga tshigwada tshiṭuku, o fhambana nga ngomu ha tshikalo tsha fhasi na tshiṭuku tshi re vhukati ha 24 na 40 kha 100 u itela u di rwa khana ha nṭha, na vhukati ha 30 na 41 kha 100 kha vhe vha dzhia tswikelelo dza S&T dza Afurika Tshipembe sa dzine dza vha khwine u fhira dzine dza vha kha mañwe madzingu oṭhe. Hezwi zwi amba uri MaAfurika Tshipembe vho vha vha tshi anzela u tšanganedza mavhonele a fanaho nga vhuphara a u dikukumusa kha zwine S&T ya zwi swikelela, hu sa londwi vhubvo havho ho fhambanaho.
- Vhane vha vhiga u di rwa khana huhulwane kha u swikelela ha S&T ho vha hu vhaaluwa vha Vharema vha Afurika, vhane vha vha na u swikelela pfunzo nṭha, vhe vha wana thikhedzo ya pfunzo ya hayani yo engedzeaho, na magudiswa na vhagudi.
- Vhane vha dzhiela nzhele mvelelo dza S&T dza Afurika Tshipembe sa dza khwine u fhira dza mañwe mashango vho vha vhaaluwa vha Vharema vha Afurika, vhane vha vha na u swikelela pfunzo ya fhasi na thikhedzo ya nṭha ya pfunzo ya hayani, na vhane vha dzula kha vhupo vhu si ha fomala ha doroboni.
- Zwo fhambanaho na zwenezwo, vhe vha dzhiela nzhele mvelelo dza S&T dza Afurika Tshipembe sa dzi si dza khwine u fhira zwe zwa swikelwa kha mañwe mashango vho vha vha vhaaluwa vha India/Asia na Vhatshena, vhane vha vha na pfunzo ya nṭha, na vhane vha dzula mahayani o pfumaho a SES.

11.2 Phuluphedziso dza S&T kha vhatu vhaṭuku

Lushaka lwo ṅea phuluphedziso ya vhukoni ha ṅṅha ha S na T kha vhatu vhaṭuku. Ezwi zwi rumela mulaedza wa vhuḽi kha vhatu vhaṭuku nga ha vhundeme na ndeme ya vhukoni ha S na T.

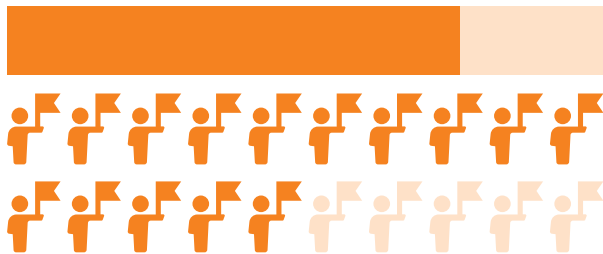
Vhatu vhaṭuku vha tea u ṭuṭuwedzwa u guda nga ha S&T

86



S&T i lugisa vhatu vhaṭuku u fhindula kha dzi dzi khaedu kha tshitshavha tsha hanefho

76



Vhuvha ha avho vhevha kala phuluphedziso dza zwickili zwa ṅṅha zwa S&T

- MaAfurika Tshipembe vho vha vha tshi anzela u ṭanganedza mavhonele avhuḽi nga ha phuluphedziso dza zwickili zwa S&T kha vhaswa, hu sa londwi vhubvo havho ho fhambanaho.
- Vhe vha vhone fulufhelo ḽihulwane kha S&T vho vha na:
 - U fhira pfunzo ya phuraimari,
 - Vho vha vha na thikhedzo khulwane u bva hayani.

Zwickili zwa khomphiyutha na didzhithaḽa zwi kho vha zwa ndeme kha vhatu vhaṭuku

85



Nḽalukanyo ya S&T i ṅea vhatu vhaṭuku u khetha mishumo minzhi u fhira dziṅwe nḽalukanyo

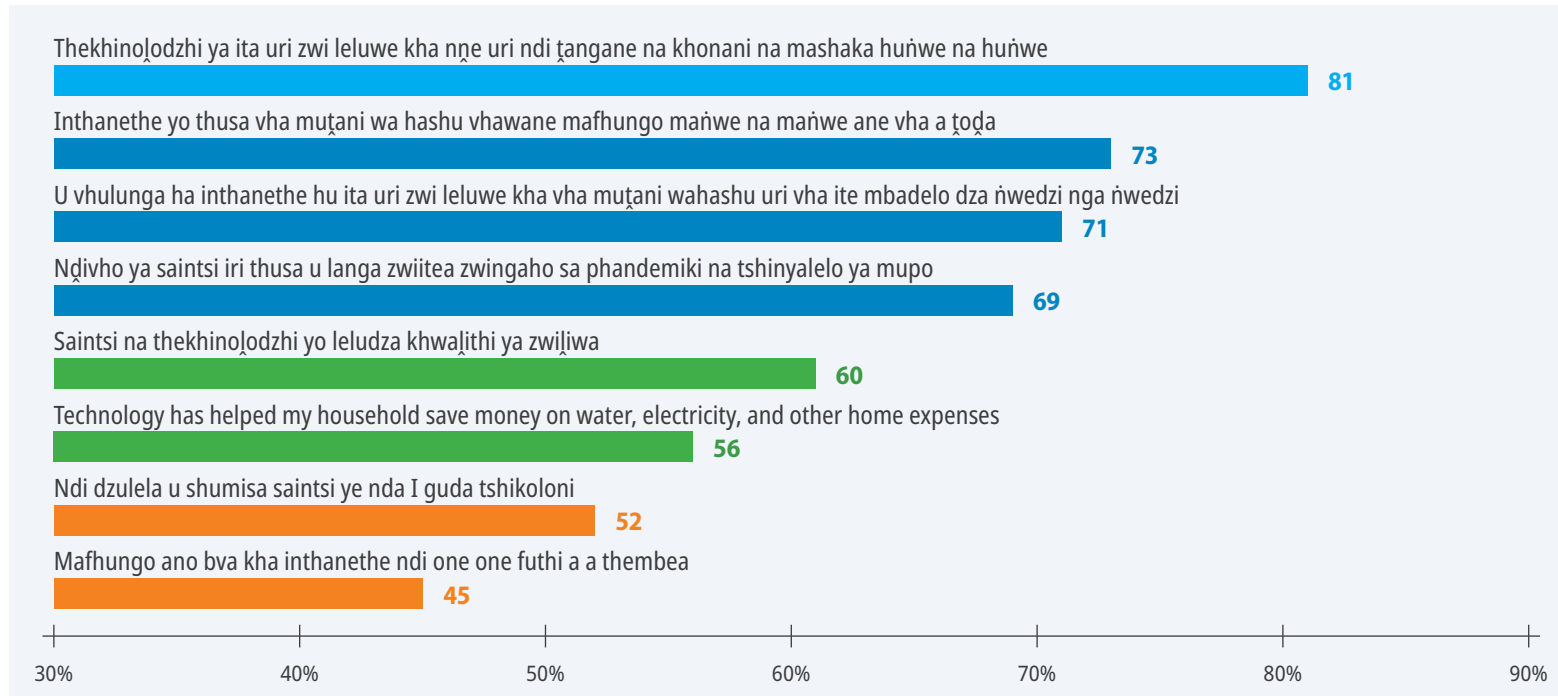
76



11.3 U dzhiela nzhele ha tshenzhemo kha S&T in vhutshilo ha d̥uvha na d̥uvha

Ri na khonadzeo khulwane ya u dzhiela nzhele tshithu tshine ra tshivhona tshi tsha ndeme matshiloni ashu.

Who dzhielaho nzhele kha S&T na tshenzhemo kha matshilo a d̥uvha na d̥uvha (phesenthe ya thendelano)



Who dzhielaho nzhele dza n̄tha dza tshenzhemo S&T

- Vha malo kha vha fumi vhahulwane vho dzhielaho nzhele ya S & T ya u vha na u kona u t̄angana na mashaka na dzi khonabi, musi vhasumbe kha vha fumi vho dzhiela nzhele S&T kha n̄divho yo d̄iswa na u d̄iswa ha mushumo kha vhutshilo havho ha d̥uvha na d̥uvha.
- Vhaṭuku kha hafu ya lushaka vho tenda uri mafhungo a no bva kha inthanethe o vha a one one a tshi fulufhedzea.
- Vhe vha vha vha na u dzhiela nzhele kha tshenzhemo dza n̄tha:
 - Vho vha vha na pfunzo dza n̄tha ha phuraimari na thikhedzo khulwane u bva mahayani,
 - Vho vha vha vhaṭuku, vhagudiswa, vhagudi, na
 - Vho sumbedza n̄divho ya n̄tha kha na dzangalelo kha S&T.

NDILA YA N̄THESA YA THENDELANO

Thendelano ya vhuṭumani vhukati ha miṭa na khonani yo d̄iswa nga thekhinolodzhi

81%



NDILA YA FHASISA YA THENDELANO

Vhutsini na u fulufhedzea ha nzwalelo

45%



Vharathi kha vha fumi

vhahulwane vho dzhiela nzhele S&T u gonya ha khwal̄ithi ya zwīliwa

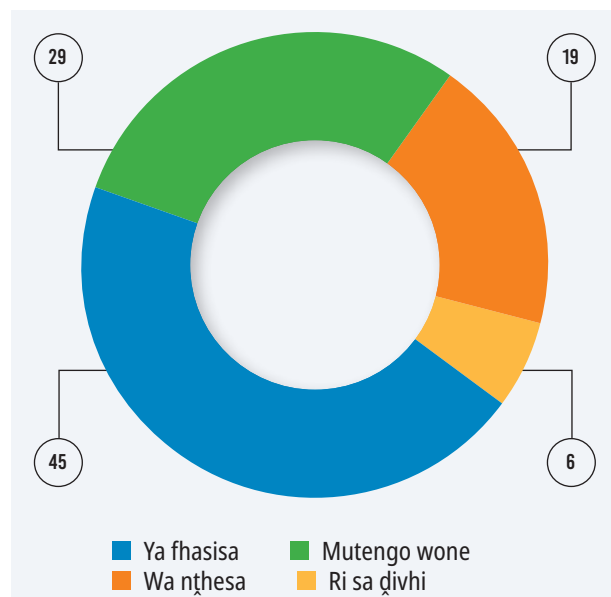
60%



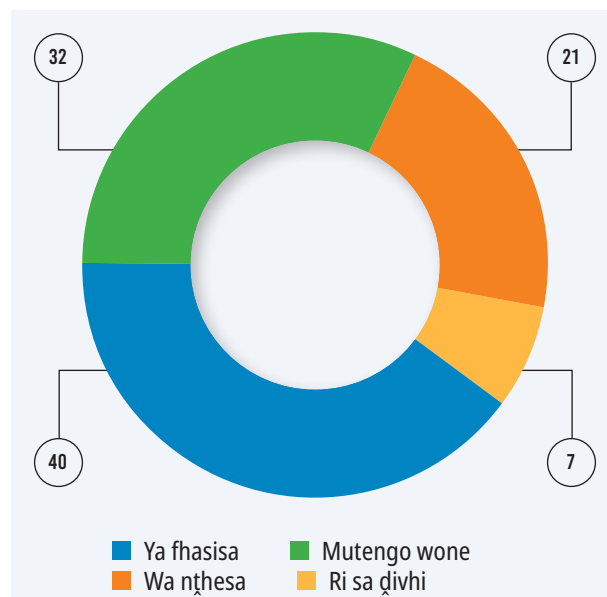
11.4 Thekhedzo ya lushaka kha u shumiswa ha R&D ya saintsi na thekhinolodzhi

Mihumbulo ya lushaka kha nyengedzedzo dza tshoquluso na mveledziso (R na D) zwi sumbedza kha muvhuso uri hu nga vhekanywa hani mugaganyagwama. Lushaka lo vha na mihumbulo ya u ri kushumisele kwa zwino nga muvhuso na mabindu mahulwane kha R na D kha S na T lu tea u tshogomelwa kana u engedzwa.

U shumisa ha R&D ha muvhuso (phesenthe)



U shumisa ha R&D nga mabindu (%)



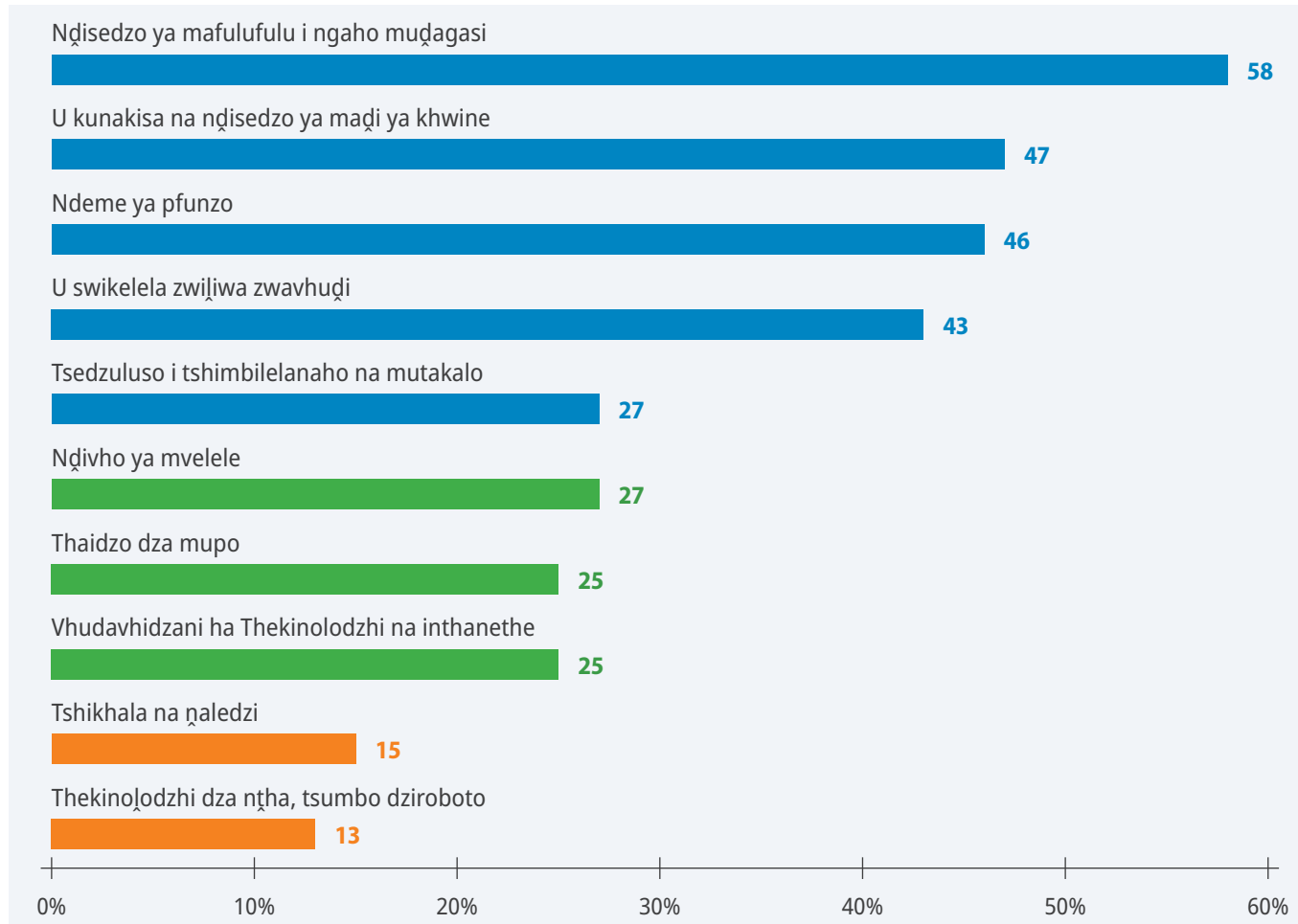
Vhuvha ha avho vhe vha vha vha na mbilaelo nga ha u shumiswa ha R&D yo vha I fhasi

- Thikhedzo ya u shumisa masheleni a R&D ya muvhuso kha S&T yo vha i na tshanduko khulwane ya tshikoro, nga tshigwada tshi tshuku, u bva kha 31 u ya kha 68 kha 100. Hezwi zwi sumbedza mavhonele o fhambanaho vhukati ha lushaka.
- Vhe vha vha vha na mbilaelo khulwane ya uri nqila ine ya vha hone zwino ya u shumiswa ha masheleni a R&D yo vha I fhasi vho vha:
 - Vhe vha vha vha na u swikelela ha pfuno dz ntha,
 - Vhe vha vha vha tshibva kha SES yo pfumesaho, na
 - Vhatshena, Ma khakadi, Maindia/Ma asia vhuawane.

11.5 Thoḡuluso yan deme ya S na T zwa Afurika Tshipembe

U bva kha mutevhe wa masia a t̄hoho dza ndeme dza S&T dza musalauno, tshitshavha tsho nanga masia maḡa a t̄hoḡisiso ane vha pfa uri muvhuso u tea u bvela phanḡa na u ḡetshedza masheleni. Zwithu zwa ndeme zwa nḡhesa zwi tshimbilelanaho na ḡetshedzo ya muḡdagasi, nḡisedzo ya maḡi, na vhuimo ha pfunzo; ngeno zwithu zwa ndeme zwa fhasisa zwo vha zwi tshikhala na ḡaledzi, na thekinolodzhi dza nḡhesa, dzi ngaho dzirobotho.

Thoḡuluso yan deme ya Afurika Tshipembe kha vhumatshelo ha t̄hoḡuluso ya u ḡea masheleni (%)



ZWA NDEME ZWA NḡHESA
Nḡisedzo ya muḡdagasi

58%



ZWA NDEME ZWA FHASISA

Thekinoḡodzhi yo aluwaho, u nga sa dzi robotho

13%



- Zwithu zwiḡanu zwa nḡha zwa t̄hoḡisiso zwa ndeme zwa masheleni a tshifhinga tshi ḡaho (ba a dza lutombo), dzo khethiwaho nga lushaka dzi dzhiwa sa ‘nga u ḡavhanya na dza ndeme’. Dzi imela khaedu dza tshitshavha dza musalauno, mvelelo dzadzo dzi vhumbarho tshipiḡa tsha tshenzhemo dza ḡuvha na ḡuvha dzo tshilaho dza lushaka.
- Sethe ya vuvhili ya zwithu zwa ndeme (dziba a dala) i nga khethekanywa sa ‘ya ndeme, fhedzi hu si nga u ḡavhanya’.
- Sethe ya vhuraru ya zwithu zwa ndeme zwi nga wela kha khethekanyo ya t̄hoḡisiso ya “makole a lutombo” luḡa lwa t̄hoḡisiso, hune tshumiso dza vhukuma dza vha dzi si nga u ḡavhanya zwi vhonala kha lushaka.

12

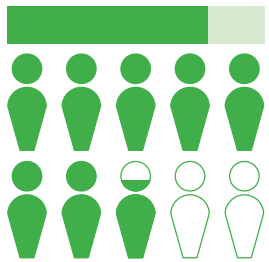
Munwe wa vhushaka ha lushaka lwa Afurika Tshipembe na saintsi

Kha tshinwe na tshinwe tsha zwiṭalusi zwiṭuku zwo topolwaho zwa 27, ro vhalela (i) tshikoro tsha vhukati tsha u engedza (kha 100), na (ii) u fhambana ha tshikoro, nga u vhalela phambano vhukati ha zwikoro zwa nṱhesa na fhasisa zwa vhukati kha zwigwada zwiṭuku zwo fhambanaho.

ZWIKORO ZWA VHUKATI ZWA NṱHESA ZWA MAGA A:

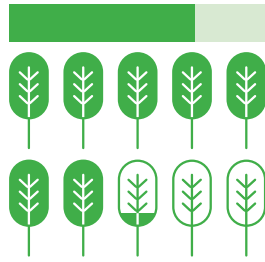
Phuluphedziso dz S na T kha zwikili zwa vhathu vhaṭuku

78



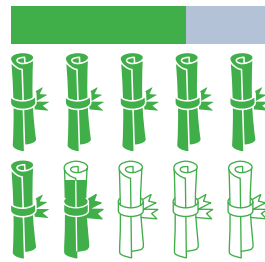
Mbilaelo dza mupo

72



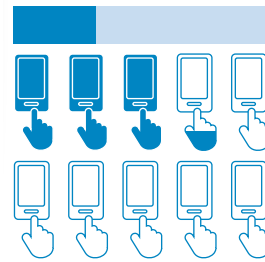
Fulufhelo kha mafhungo a S na T u bva dzi yunivesithi

68



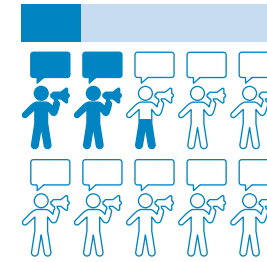
U shumiswa ha zwishumiswa zwa muyani

32



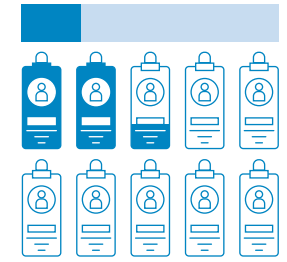
U dzhenelela hoy a ho kha tshitshavha

23



U dzhenelela nga u kungwa nga zwiitea

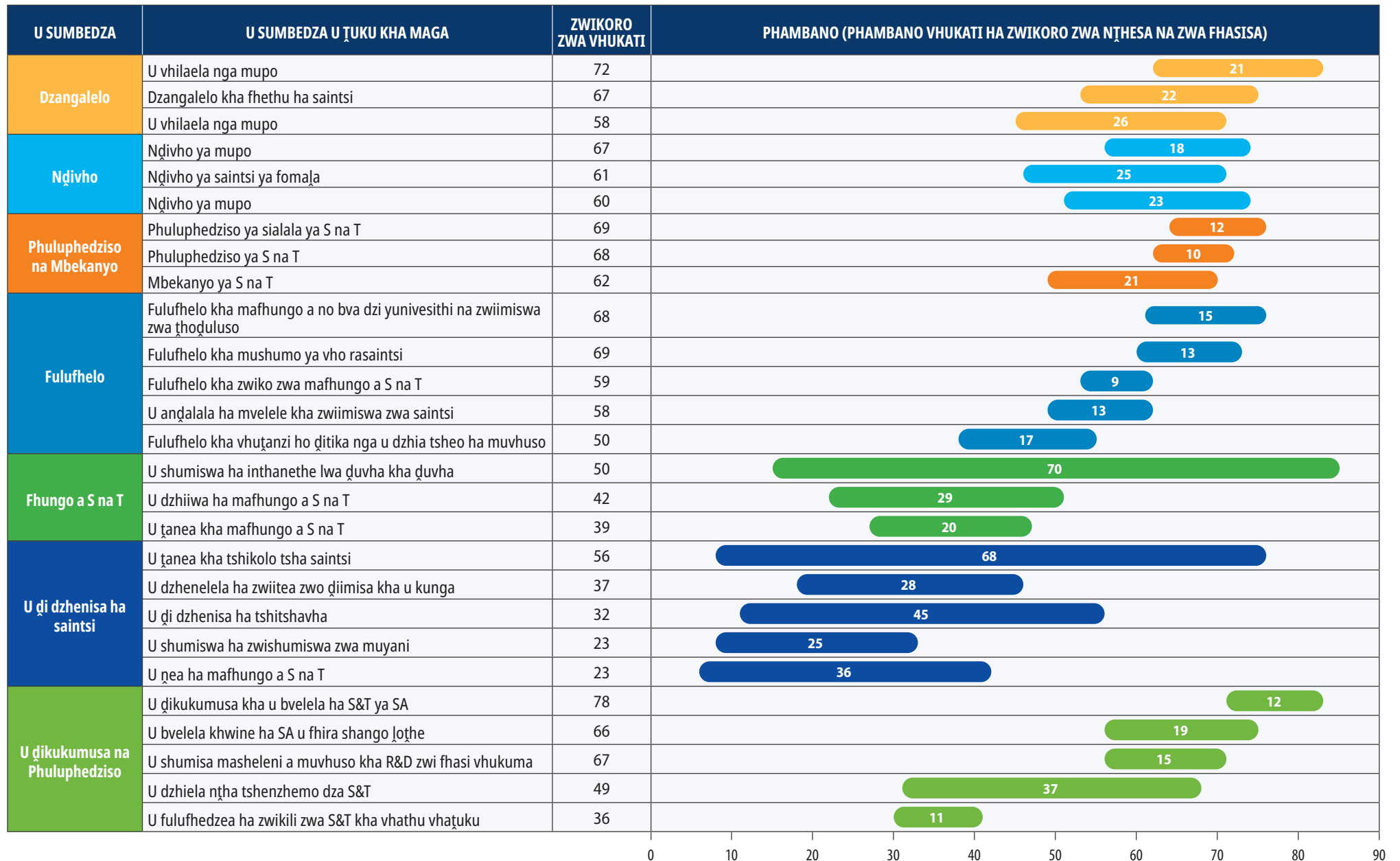
23



Nga nḽila i fhambanaho, u phaḽaladzwa ha zwikoro zwo vha zwi nṱhesa kha u shumiswa ha inthanethe ḽuvha na ḽuvha (70) na u ṱangana na thero dza davhi dza tshikolo (68), nahone yo vha i fhasisa kha maga a u themba, phuluphedziso, na mavhonele a u vhulunga. U fhambana ha tshikoro tshiṭuku, tshe ra tshi vhidza sa maga a u lingana, zwi amba uri mavhonele a lushaka a a fana, hu sa londwi u fhambana ha matshilisano-a demogirafi. U fhambana ha zwikoro zwo ṱanḽavhuwaho, zwo vhidzwaho sa maga o ṱanḽavhuwaho, zwi sumbedza u sa eḽana nga nṱwambo wa u ṱanḽavhuwa ha matshilisano-a demogirafi a vhathu vhahulwane.

Ro mbo ḽi sika “munwe” wo khetheaho wa vhushaka ha lushaka lwa Afurika Tshipembe na saintsi nga u pulota tshikoro tsha vhukati, khathihi na u fhambana ha tshikoro tsha maga maṱwe na maṱwe, ane a fara nga nḽila yo leluwaho u fhambana ha nḽivho yashu ya saintsi, mavhonele, na maga a u ḽi dzhenisa.

12.1 Ndivho ya saintsi, mavhonele na u sumbedza u di dzhenisa, maga, zwikoro zwa vhukati, phambano dza zwikoro



12.2 U khethekanya maga a vha thaipologi n̄ha

U itela u pfesesa khwine u fhambana ha vhushaka ha lushaka na saintsi, ro shumisa u fhambana ha tshikoro tsha vhukati na u fhambana ha tshikoro kha maga mañwe na mañwe. Ro sika khethekanyo dza tshikoro tsha n̄ha na tsha fhasi tsha vhukati (dzine ra shumisa tshikoro tsha vhukati tsha 50 sa fhethu ha u fhungudza), na u fhambana ha zwikoro zwo țanđavhuwaho (kana zwo fhambanaho), na u fhambana ha zwikoro zwițuku (kana zwa lutendo) (u shumisa u fhambana ha 20 sa țhodzi ya u fhungudza). Ro sika zwigwada zwiņa.

MAVHONELE A LUTENDO ARE NA ZWIKORO ZWA VHUKATI ZWA N̄HA

- Ndeme ya vhukoni ha S&T kha vhutshilo ha đuvha na đuvha
- U đikukumusa kha u bvelela ha S&T ya SA
- U fulufhedzea ha zwikili zwa S&T kha vhatu vhațuku
- Phuluphedziso mavhonele nga ha S&T
- Mbetselwa mavhonele nga ha S&T
- Fulufhelo kha mushumo ya vho rasaintsi
- Fulufhelo kha mafhungo a no bva dzi yunivesithi na zwiimiswa zwa țhoduluso
- Fulufhelo kha zwiko zwa mafhungo a S na T
- U aņđalala ha mvelele kha zwiimiswa zwa saintsi

MAVHONELE O ȚANĐAVHUWAHO A RE NA ZWIKORO ZWA VHUKATI ZWA N̄HA

- Nđivho yo swikelelwaho nga vundu Ța saintsi
- Nđivho ya saintsi ya fomaȚa
- U dzumbululwa ha matavhi a thero tshikoloni
- Nđivho ya mupo
- Mbilaelo dza mupo
- Dzangalelo nga u angaredza kha S na T
- Dzangalelo kha mavunđu a S&T o tiwaho
- Phuluphedziso ya sialala ya S na T

MAGA O ȚANĐAVHUWAHO ARE NA ZWIKORO ZWA VHUKATI ZWA FHASI

- U shumiswa ha inthanethe lwa đuvha kha đuvha
- U shumiswa ha zwishumiswa zwa muyani
- U țanea kha mafhungo a S na T
- U dzhiiwa ha mafhungo a S na T
- U țanganelana ho đı dzhenisa kha u kunga
- U ñea ha mafhungo a S na T
- U shumisa masheleni a muvhuso kha R&D zwi fhasi vhukuma

MAGA ZWA LUTENDO ZWIRE NA ZWIKORO ZWA VHUKATI ZWA FHASI

- U bvelela khwine ha SA u fhira shango Țoțhe
- Fulufhelo kha vhuțanzi ho đitika nga u dzhia tsheo ha muvhuso



13 Mvelolo dza u khaṭhisa vhushaka ha lushaka na saintsi Afurika Tshipembe



1

U ǀI DZHENISA HA SAINTSI ZWI TEA U VHA NA ǀONGISA SAINTSI NA VHUVHA HA TSHITSHAVHA

Ngudo ya zwino, khathihi na nǀila ya DSI kha mbekanyamushumo ya u dzhenelela ha saintsi, i wanala nga ngomu ha vhuvha ha saintsi-kha-tshitshavha ine ya dzhiela nǀha mvelo ya nǀila mbili na ya nyambedzano ya vhushaka vhukati ha saintsi na tshitshavha, khathihi na mishumo ya vathu na zwiimiswa.



2

RI TEA U SHANDUKISA ǀHALUTSHEDZO NGA HA URI RI VHISA HANI NA U ǀALUTSHEDZA LUSHAKA LWA AFURIKA TSHIPEMBE

Mihumbulo ya maAfurika Tshipembe i a humbulela, i dzhielwa nǀha, yo linganyisela, nahone i sumbedza nǀivho ya mveledziso dza S&T. U swika tsini na hafu ya maga o ǀoliwaho, tshitshavha tsho sumbedza mavhonele a fanaho hu sa londwi vhubvo havho ha matshilisano na demogirafi. Kha mañwe maga ho vha na u fhambana vhukati ha phindulo dza tshitshavha.



3

NI NGA SI KHAKHE NGA U ENGEDZA NǀIVHO YA SAINTSI

Mbekanyamushumo dza u ǀivha saintsi ya lushaka dzi tea u nǀetshedzwa nga kha pulatifomo nnzhi dza nyanǀadzamafhungo ya mvelele na dza matshilisano, u dzhenisa saintsi ine ya vha tshipiǀa tsha tshenzhemo ya muthu nga eǀhe nga ngomu ha nyambedzano ya lushaka.

**4****NYENGEDZEO KHA DZANGALELO KHA S&T NA U FHAṬA TSHITSHAVHA TSHINE TSHA ṬUṬUWEDZA SAINTSI YA MVELELE**

Tshikalo na u swikelela ha mbekanyamushumo dza u ṭanganedza saintsi dza zwino zwi tea u engedzwa, nahone mbekanyamushumo ntswa dzi re na zwi re ngomu zwo teaho na dzi kwamaho dzi tea u thomiwa na u ḡivhadzwa nga kha ṅḡila dzo fhambanaho. Mbekanyamushumo idzi dzi fanela u sedza kha u dzhenisa mvelele ya u ṭoḡa u ḡivha ha saintsi na ṭhoḡisiso kha tshitshavha.

**5****ṆḊIVHO YA, DZANGALELO KHA, NA MBILAELO YA S&T ZWI NA U VHUSHAKA NGA MANNḊA**

U sedza kha dzangalelo zwi nga vha zwi tshi nga kona u dzhenelela. Hezwi zwi na khonadzeo ya u sika mutevhe wa vhukuma na u vha na mbuelo dza u rwa na u ṭanganya kha maṅwe maga o ṭoḡisiswaho kha ngudo iyi, u fana na ṅḡivho na mbilaelo.

**6****U DZHENELELA HA PFUNZO YA HAYANI NA MAFHUNGO A U ḊI DZHENISA**

Kha tsenguluso yoṭhe, tshiga tsho bvelelaho tsho vha tshi thikhedzo ya hayani ya pfunzo nga tshivhumbeo tsha u ṭuṭuwedza u vhala, mushumo wa hayani, na khaseledzo ya mafhungo, khathihi na u shuma zwavhuḡi na u dzhia thero dza saintsi tshikoloni. Thikhedzo ya pfunzo ya hayani i sumbedza ndeme ya u ṭoḡa u ḡivha nga ha mirafho na u fhaṭa ṅḡivho.

**7****MBETSHELO NGA HA PHULUPHEDZISO DZA, NA NGAHA U ḊIKUKUMUSA NA FULUFHELO KHA S&T DZI TENDA KHA VHUVHA**

U ṭanganya na u bvela phanḡa na u fhaṭa kha mihumbulo iyi zwi ṭoḡa u kwhaṭhisedza sisṭeme ya mvelele ine ya dzhiela ṅṭha, u pembelela, na u ṭuṭuwedza S&T. Ri fanela u sika mvelele ine ya sumbedza maitete a u dzhia tsheo o thewaho kha vhuṭanzi, khanedzano, u sasaladza, na u ṭaṭisana ha mihumbulo.



8

NDILA YA NDIVHO YA SAINTSI NA U SWIKELELA, U TANA KHA NA U DZHIA HA MAFHUNGO A S&T ZWO ANGALALA KHA VHUVHA

Zwivhumbeo zwihulwane zwine zwa qivhadza u fhambana uhu ndi u swikelela pfunzo, vhuimo ha matshilisano na ikonomi, na u vha mutshudeni kana mugudiswa. Vhudavidzani ha saintsi ho engedzeaho na u t̄anganelana nga kha dzitshanele nnzhi, u bva kha u gandisa u ya kha khasho ya nyanqadzamafhungo, zwi fanela u t̄utuwedzwa na u n̄ewa maanda.



9

U ENGEDZA U SWIKELELA KHA MAFHUNGO A S&T

Kotara tharu dza lushaka vha na tswikelelo ya inthanethe. Lushaka lu fulufhela mafhungo a S&T o n̄etshedzwaho nga televishini na radio fhedzi vha t̄hogomela nga ha mafhungo a S&T kha nyanqadzamafhungo ya matshilisano. Mafhungo a S&T a tea u qivhadzwa nga ndila dzi p̄feseseaho nga hu leluwaho, nga maanda kha televishini na kha radio.



10

U FHAMBANA HUHULWANE KHA U DI DZHENISA HA MAITELE A SAINTSI ZWI A GODOMBEDZA FJEDZI ZWINGA VHA NA U SHELA MULENZHE HA VHUDI NGA U ALUSA NDIVHO YA SAINTSI NA LUTAMO NA U KUNDA ZWI THIVHAHO U SWIKELELA ZWIVHUMBEO

Nga u angaredza, zwikalo zwa fhasi zwa u dzhenelela ha saintsi zwo vhonala kha tshaka dzothe dza u t̄anganelana. Mafulo a u t̄utuwedza u shumiswa ha mafhungo, dzangalelo na ndivho, zwo t̄angana na u lingedza ha u t̄utuwedza tswikelelo khulwane kha fhethu na zwiitea zwa S&T, zwi qo lavhelelwa u vha na mvelelo dzavhudi kha zwikalo zwa u dzhenelela ha saintsi.



11

U FUNZA LUSHAKA NGAHA VHUNDEME HA SIALALA LA S&T

Hu na t̄hoq̄ea ya u lingedza u di dzhenisa ha u d̄avidzana, u qivhadza, u funza, u pembelela, na u sika ndivho nga ha sia ili lo pfumaho la S&T kha vhatu vhanzhi.

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U swikilelea Zwifhato Shango
 Dzi esidi 4IR Foswo Zwi tshilaho
 Dzindimo Dzindila Ku tshilele
 U khwinifhadza Madithu asa wanali shangoni Mililo
 U andana Muya Mbuno Dzi nzhini
 Malofha Bisi Thoduluso
 CD Dziphukha Zwi shumiswa zwa mudagasi
 Dzi tsheo zwi hulu/tshihulu U swa
 nga vhuphara Vhumatshelo Fene Zwa ikonomi
 Tsiko ya Mudzimu Zwiko Mafhungo
 Zwishumiswa Mufhiso Mupo Mutshini Mudagasi
 Tshibogisi tsha mudagasi Tshifhinga Tshipirioni tshi takadzaho
 Mulilo Didzhithala Zwivhaswa Zwiliwa
 Luisimane Vhutshilo ha duvha na duvha
 Thelevishini Zwi songo doweleaho
 Furidzhi Zwiliwa Vhurereleli
 Zwi takadzaho Murafho

Zwifhato U vhulunga
 Zwalunako Khwinifhadzo
 Ndivho ya zwi si zwavhukuma
 Vhutumani 5G U kulumaga
 Dzi thingokhwalwa Muya U bvelela
 Dzigoloi
 DNA Zwa u fhata Khomphiyutha Khamera
 Zwa mudagasi Dzimbuno Mupo
 Muya Madambi Ndingedzo Zwifhato
 Muvhili wa muthu
 Mishonga Dzi athomo
 Dzi thambo Zwi songo doweleaho
 Fhethu vhupo Nyambedzano
 Mutsho Dzikhamphani
 Zwa sialala na mvelele
 Zwithuthubi U swikilelea Mulilo
 Zwishumiswa Zwa ndevheni U sedzulusa Thekholodzhi
 Ha mudagasi Zwiitwa nga muthu
 U khwinifhadza matshilo
 Madambi Ndivho ya zwi si zwavhukuma



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