

IsiZulu

# Amaphuzu Avelele Obudlelwane Nomphakathi WaseNingizimu Afrika Nesayensi: Imiphumela Yocwango Lwango-2022



science, technology  
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Science, Technology and Innovation  
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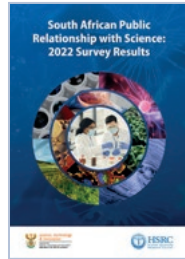
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## **Ikhiqizwe Umkhandlu Wocwaningo Lwesayensi Yabantu (i-HSRC) egameni loMnyango Wezesayensi Nokusungula (i-DSI).**

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### **Ukucaphuna lo mbiko:**

Umnyango wezeSayensi kanye Nokusungula (2024) Okugqamile koBudlelwane boMphakathi waseNingizimu Afrika neSayensi: 2022 Imiphumela yocwaningo. Ilungiselwe uMkhandlu Wocwaningo Ngesayensi Yabantu woMnyango Wezesayensi Nokusungula. Pretoria: HSRC.



### **Lo mbiko Wamaphuzu Avelele usekelwe embikweni ogcwele:**

Umnyango Wezesayensi Nokusungula (2024) Ubudlelwano Bomphakathi WaseNingizimu Afrika Nesayensi: Imiphumela Yocwaningo Lwango-2022. Ilungiselwe uMkhandlu Wocwaningo Ngesayensi Yabantu woMnyango Wezesayensi Nokusungula. Pretoria: HSRC

Inombolo yePhrothokholi yeKomidi Lezimiso Zokuziphatha REC/Ukuvuselelwa kweNombolo yePhrothokholi REC 5/17/08/11: Ucwano Lwesimo Senhlalo YaseNingizimu Afrika (SASAS) 2019.

Ubudlelwano BaseNingizimu Afrika Nomphakathi Nesayensi (i-SAPRS): Umphumela Wocwaningo Lonyaka ka-2022 uwumvuthwandaba weminyaka engaphezu kwemine yomsebenzi obandakanya ukucatshangelwa kocwaningo, ukwakhiwa kwamathuluzi, ukuqoqa idatha, ukuhlaziya idatha, nokubhala umbiko.

Bekuwukubambisana phakathi koPhiko Lokuthuthukisa Isayensi eMnyangweni wezeSayensi nokuQamba kanye noHlelo Lokucwaninga Lwezemfundo Nezomnotho Elinganayo (EEE) eMkhandlwini Wocwaningo Lwezesayensi Yabantu. Ithimba le-DSI laliholwa nguMnu Isaac Ramovha kanye nethimba labacwaningi be-HSRC nguDkt Vijay Reddy.

Phakathi neminyaka emine, amalungu ethimba labacwaningi abalulekile kwakunguDkt Vijay Reddy, uDkt Benjamin Roberts, uNksz Sylvia Hannan kanye noDkt Steven Gordon.



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# 1 Isingeniso

Ulwazi lwesayensi luphakamisa ukuqonda kwethu umhlaba, ngokwethu, nobukhona bethu. Kunokuvumelana okubanzi kokuthi izinjongo zesayensi kufanele zidlulele ngale kwemithelela yezomnotho nezobuchwepheshe, ukuze kubhekwane nezinselelo zamanje zomhlaba nezendawo ezithinta ukuphila kwethu ngokuqondile. Kusukela ezinsukwini zaso zakuqala, umbuso wentando yeningi waseNingizimu Afrika wakubona ukubaluleka kobudlelwane phakathi komphakathi nesayensi, nokuthi bonke abantu baseNingizimu Afrika kufanele babambe iqhaza ekuthuthukisweni koHlelo LukaZwelonke Lokusungula (i-NSI).

UMnyango Wezesayensi Nokusungula Izinto, kanye nabalingani bawo, unomthwalo wemfanelo wokukhuthaza ukusebenzelana kwesayensi ngaphakathi kwe-NSI. I-White Paper on Science, Technology and Innovation (STI) yakamuva yakhelwe phezu kwemizamo yangaphambilini ngokumela umphakathi onolwazi ngesayensi nesayensi, kanye nokugxila okuvuselelwe kwezesayensi – ukuxhumana komphakathi (DST 2019a). Ukuze kuhlolwe inqubekelaphambili ekufinyeleleni umphakathi ofisa ukwazi ukufunda nokubhala nowazi ngesayensi, i-DSI iqale yasungula iqoqo lezinkomba zokulinganisa ukusebenza kokusebenzelana kwesayensi okubanzi. Okwesibili, yamukele iqoqo lezinkomba ezincane ukwazisa inhlolovo yezikhathi ezithile yomphakathi waseNingizimu Afrika wabantu abadala ukuze kulinganiswe futhi kuqashwe amazinga olwazi lwesayensi, izimo zengqondo, kanye nokuzibandakanya.

Izinhlalo zokubandakanya iSayensi kanye nokukalwa kobudlelwano phakathi komphakathi nesayensi zafakwa ezikhungweni ngezinqubomgomo namasu

amaningana, okuyiScience Engagement Strategy (DST, 2015), i-White Paper on Science, Technology and Innovation (DST, 2019a), iSayensi. I-Engagement Monitoring and Evaluation Framework (DST, 2019b), kanye Nokuqapha Nokuhlola Ukusebenzisana Kwesayensi I-Impact Indicator Framework (DST, 2021).

Inhlolovo yokuqala ebanzi ehloselwe ukulinganisa nokuqapha amazinga omphakathi olwazi lwesayensi, izimo zengqondo, kanye nokuxoxisana kwenziwa ngo-2022. Ucwangingo luzophindwa njalo ngemva kweminyaka emihlanu. Umbiko ophelele – [Inhlolovo Yobudlelwane Bomphakathi WaseNingizimu Afrika Nesayensi: Imiphumela Yonyaka wezi-2022 \(DSI, 2024\)](#) – ishicilelwe. Lo mbiko ogqamile uchaza kafushane indlela yocwangingo kanye Nohlaka Lwezinkomba Zokusebenzisana Kwesayensi Yokuqapha Nokuhlola Umthelela (SEMEIF) olwazisa ukwakhiwa kolwazi lwesayensi engama-27, izimo zengqondo, nezindlela zokubandakanya. Ngemva kwalokho, sifingqa imiphumela eyinhloko ngokuchaza amaleveli (amaphuzu amaphakathi) kuzo zonke izilinganiso ezihlukahlukene, kanye nokuhluka kwamaphuzu kusilinganiso ngasinye. Okulandelayo, sibika ukuthi yiziphi izici zenhlalo yabantu okungenzeka ukuthi ziholele olwazini lwesayensi oluhle, izimo zengqondo, kanye nokuzibandakanya.

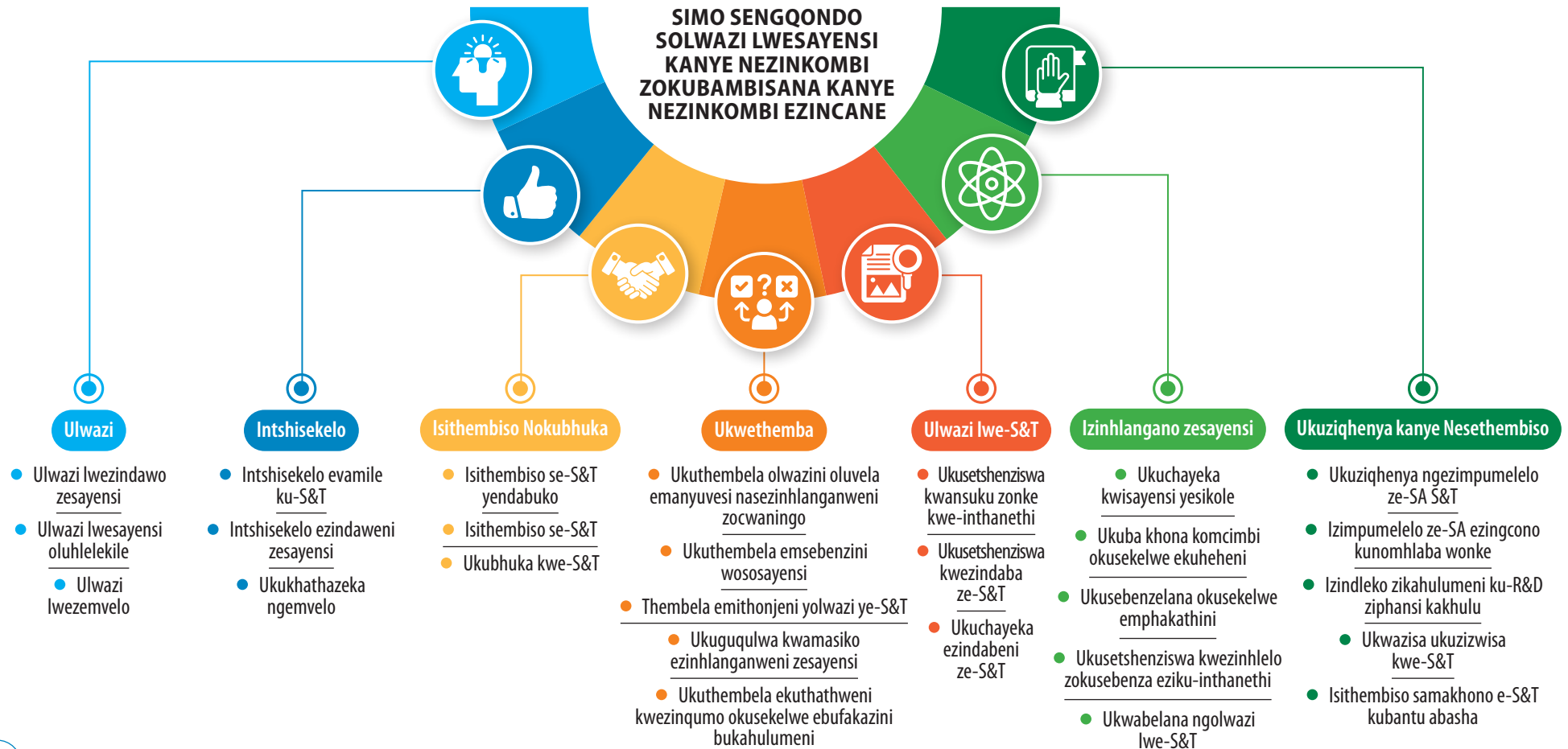
Sibe sethula imigxivizo yeminwe yobudlelwano bomphakathi waseNingizimu Afrika nesayensi sisebenzisa isilinganiso samaphuzu nokuhluka phakathi kwesinyathelo ngasinye kwezingama-27 zesayensi. Lezi zinyathelo zibe sezihlukaniswa ngezigaba ezine ezisekelwe esilinganisweni sazo samaphuzu kanye nokuhluka kwamaphuzu. Siphetha ngokufingqa imiphumela nezincomo.

## 2 Indlela yokufunda

<b>Isampula/Inani labantu</b>	Isampula elimele abantu abadala kuzwelonke abaneminyaka eyi-16 nangaphezulu, abakhethwe ezindaweni ezingama-500 kuzo zonke izifundazwe eziyisishiyagalolunye.
<b>Usayizi wesampula</b>	5 960 abaphenduli kusampula likazwelonke.
<b>Ithuluzi lokuhlola kanye nohlaka lokubika</b>	Uhlaka Lwezinkomba Zokusebenzisana Kwesayensi Nokuhlola Impact yazisa ukuthuthukiswa kwethuluzi lenhlolovo kanye nesakhiwo sombiko.
<b>Izingxoxo zocwaningo</b>	Phakathi kukaNovemba 2022 noJanuwari 2023, inhlolekhono yehora elilodwa yobuso nobuso yenziwa nabantu abadala abaneminyaka engu-16 nangaphezulu. Izingxoxo zenziwa ngolunye lwezilimi ezisemthethweni eziyi-11, ngokusekelwe kulokho okuthandwa ngabaphenduli.
<b>Ukuthwebula ulwazi</b>	Ngokusebenzisa indlela yokuxoxisana yomuntu siqu esizwa ngekhompyutha (i-CAPI), ulwazi lwathwetshulwa kumsizi wedijithali womuntu (PDA).
<b>Ukukalwa kwedatha</b>	Yonke idatha yalinganiswa kubantu abaneminyaka engu-16 nangaphezulu.
<b>Ukubikwa kwemiphumela</b>	Imiphumela ebalulekile ngokwezibalo ezingeni lokuzethemba elingu-95% iyabikwa.
<b>Izinguquko zenhlalo yabantu</b>	Iminyaka yobudala, ubulili, izinga lokuzuzwa kwemfundo, ukusekelwa ngemfundo yasekhaya okunikezwa abazali nabanye abantu abadala (ukufunda okusekelayo, umsebenzi wesikole wesikole njll), isimo senhlalo-mnotho esisekelwe kunkomba yempahla, isimo semakethe yezabasebenzi, indawo yokuhlala, izinkolelo zenkolo, neqembu labantu kwasetshenziswa. Lokhu sikubiza njengama-sub-groups.
<b>Igama elithi 'isayensi' libhekisela kulokhu</b>	Ukukhiqizwa kolwazi emikhakheni yezemfundo: isayensi yemvelo nokuphila, ubunjiniyela, isayensi yezehlalo, kanye nobuntu.
<b>Igama elithi 'umphakathi' liwubunye futhi liphindaphindeka</b>	Kukhona 'imiphakathi' eminingi eNingizimu Afrika esekelwe emvelweni ohlukahlukene womphakathi. Ngakho, igama elithi 'umphakathi' lihlanganisa kokubili ubunye kanye nomphakathi omningi.
<b>Sisebenzisa idatha ezibike yona</b>	Idatha yaqoqwa ngemibuzo yenhlolovo lapho ababambiqhaza banikezela ngezimpendulo zabo ngaphandle kokuqinisekisa kwangaphandle.
<b>Amaphuzu amaphakathi</b>	Amaphuzu okwakhiwa kwento eyodwa neziningi aguqulelwe esikalini esingu-0–100. Isilinganiso samaphuzu sibalwa futhi sabikwa ku-100 esewonke.
<b>Ukuhluka kwesikolo</b>	Umehluko phakathi kwesilinganiso esiphezulu nesiphansi kakhulu samaphuzu, ngamaqembu amancane.

# 3 Uhlaka Lwezinkomba Zokusebenzisana Kwesayensi Zokuqapha Nokuhlola

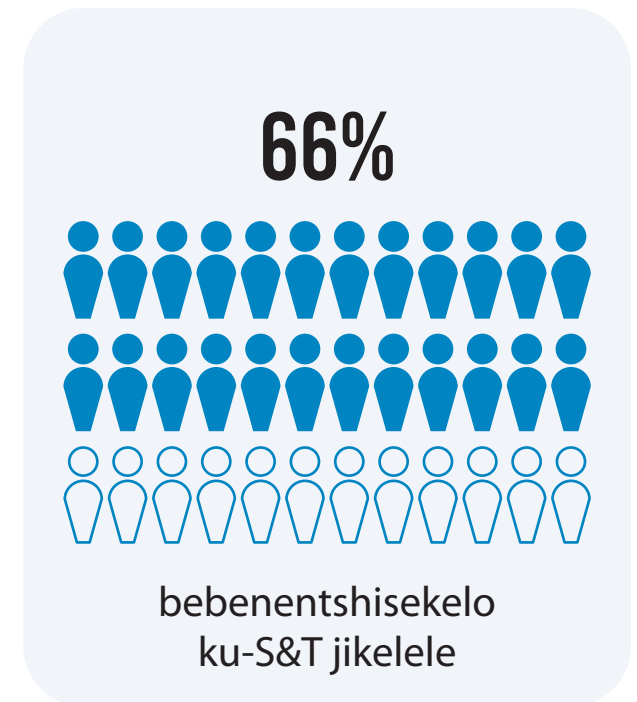
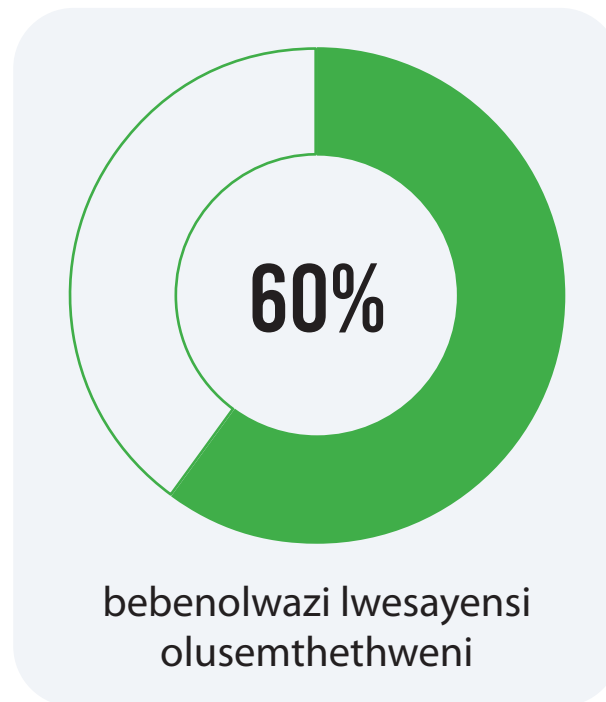
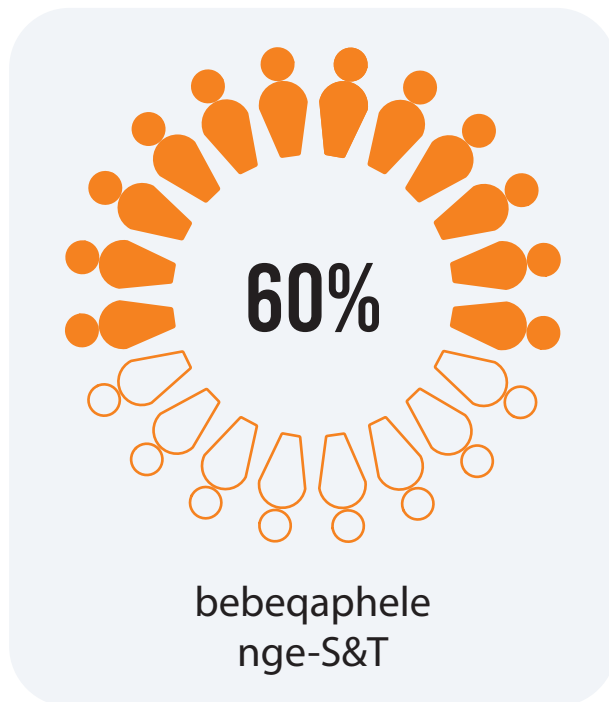
I-SEMEIIF yahllelwa kabusha kancane ukuze ifake izinkomba eziyisikhombisa noma izindikimba zomthelela kanye nezinkomba ezincane ezingama-27 noma izinyathelo zomthelela. Izinkomba bekuyisayensi nobuchwepheshe (S&T) ulwazi kanye nentshisekelo; isithembiso nokubhuka kanye nezimo zengqondo zokwethemba; Ulwazi lwe-S&T; kanye nemiphumela yokuzibandakanya kwesayensi, okuhlanganisa imibono ehlobene nokuziqhenya kanye nesithembiso se-S&T. Ukulinganisa nokusebenzisa inkomba ngayinye noma itimu yomthelela, sihlonze phakathi kwezinyathelo ezintathu kuya kwezinyisihlanu zomthelela. Ezigabeni ezilandelayo, sibika imiphumela yesihloko yesinyathelo ngasinye somthelela. Ukuze uthole imininingwane eyengeziwe ngemiphumela sicela ubheke **umbiko oyinhloko**.



# 4 Ukuqwashisa umphakathi nolwazi kanye nentshisekelo kwisayensi nobuchwepheshe

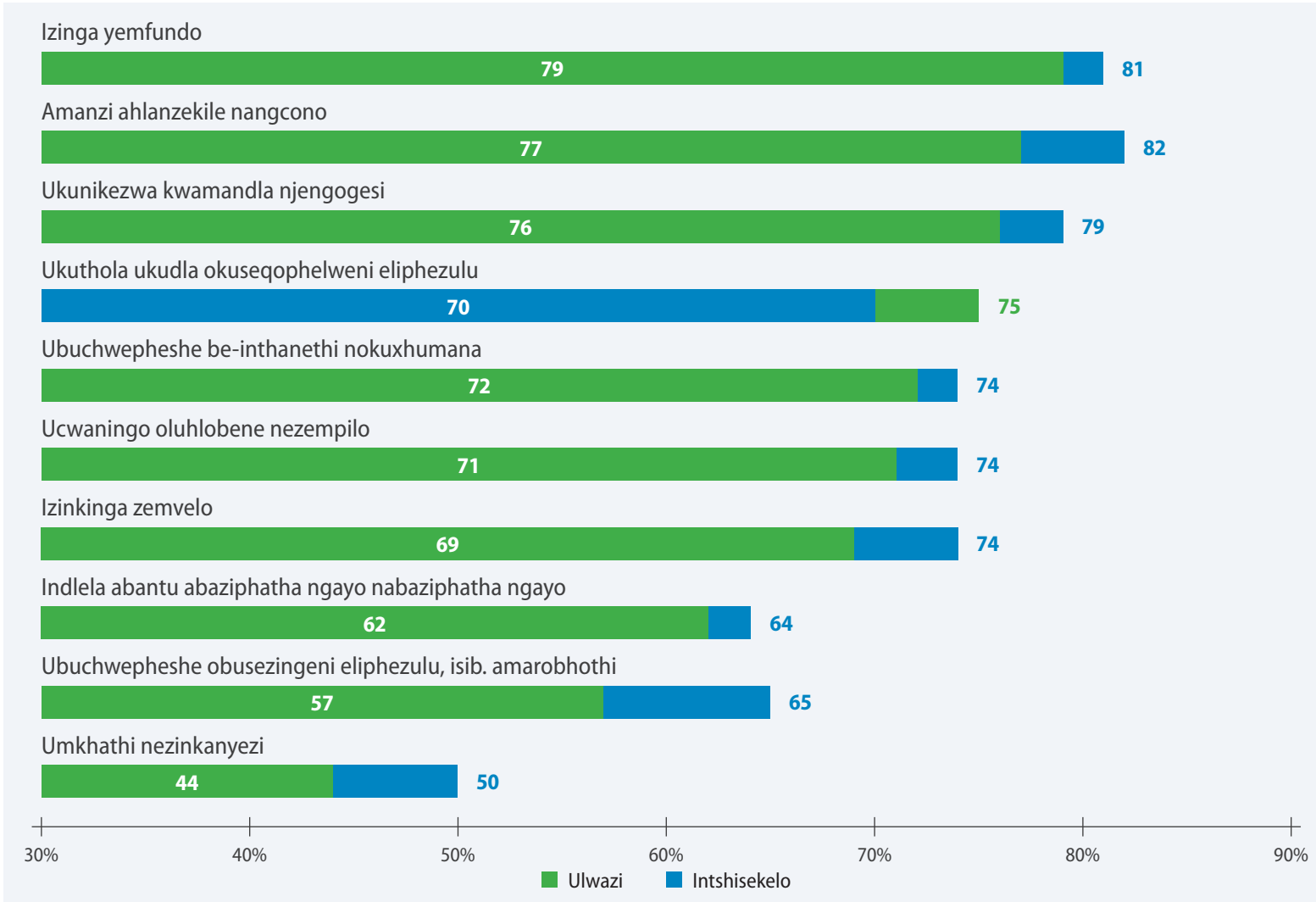
Ukuqwashisa nolwazi kanye nentshisekelo ku-S&T kunikeza imininingwane ngemvelo yobudlelwano phakathi komphakathi nesayensi. Ngokuthakaselayo, sisho ukufuna ukwazi okwengeziwe, ulwazi lubhekisela olwazini oseluvele unalo, kuyilapho ukuqaphela kubonisa ukwaziswa, nakuba kungenjalo ngokuqonda.

Umphakathi uphendule ngokuhlukene mayelana namazinga awo okuthakaselayo, ulwazi, nokuqwashisa nge-S&T. Sekukonke, abantu baseNingizimu Afrika bazi kahle, banolwazi futhi banentshisekelo ku-S&T.



## 4.1 Amaphesenti abantu abadala abanolwazi okungenani oluthile kanye nentshisekelo ezindaweni zesayensi ezibalulekile

Ngaphezu kwalokho, sihlale ulwazi lomphakathi kanye nentshisekelo kukho ezinseleleni zomphakathi zamanje ezidinga impendulo ye-S&T.



**IZINGA ELIPHEZULU  
LOLWAZI**  
Ikhwalithi yemfundo

**79%**



**IZINGA ELIPHEZULU  
LENZALO**

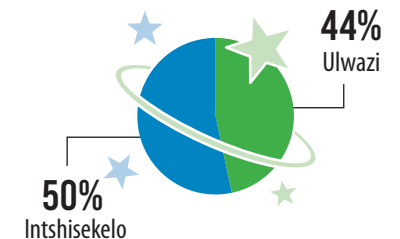
Ukunikezwa kwamanzi  
ahlanzekile nangcono

**82%**

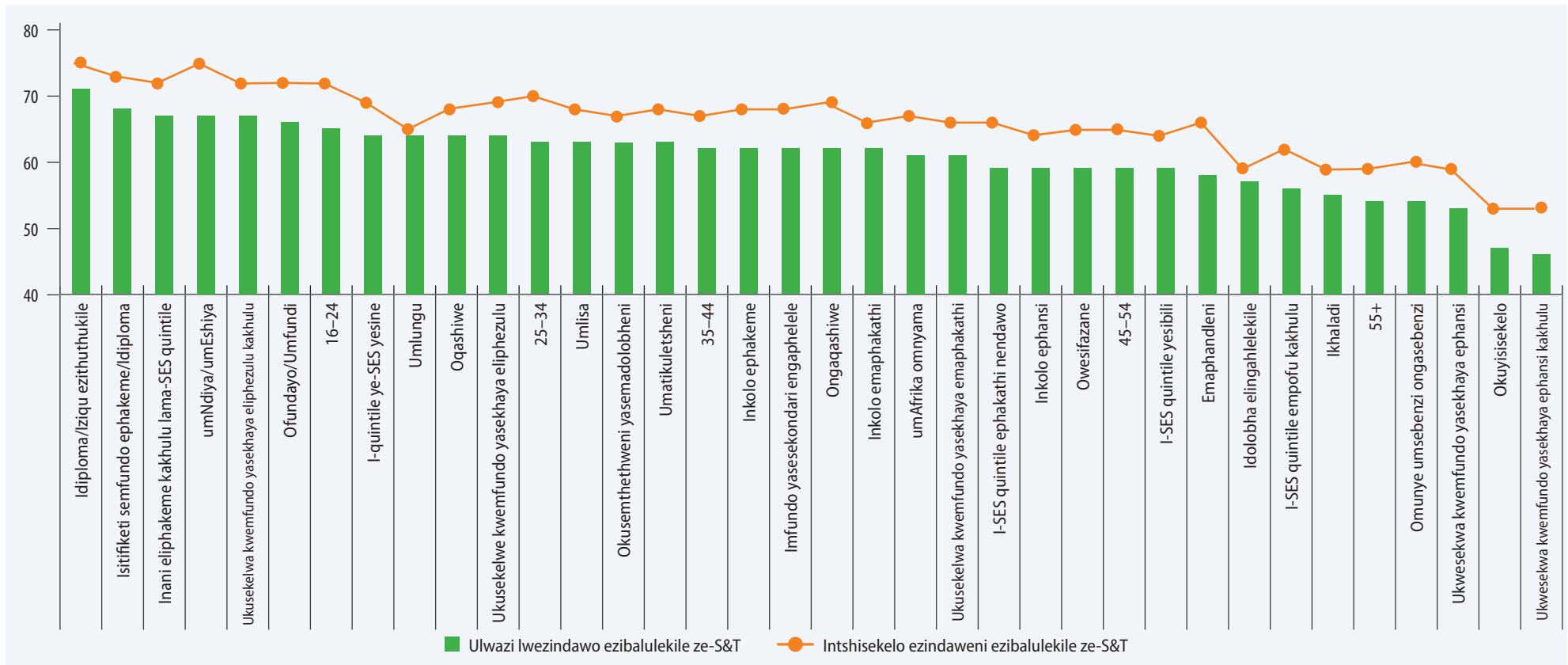


**AMAZINGA APHANSI  
KAKHULU OLWAZI  
NENZALO**

Umkhathi nezinkanyezi



## 4.2 Isilinganiso samaphuzu olwazi kanye nentshisekelo ku-S&T, ethulwa kumaqembu amancane ahlukenene



### Ubani owayanlwazi oluphakeme lwe-S&T?

Kube nokuhluka okubanzi kwamaphuzu kuwo wonke ama-sub-groups, namaphuzu ayisilinganiso olwazi lwesayensi asuka ku-46 kuya ku-71 kwangu-100, kanye nentshisekelo kusayensi kusuka ku-53 kuya ku-75 kwayi-100.

### Labo abanolwazi oluphakeme lwesayensi nomdlandla:

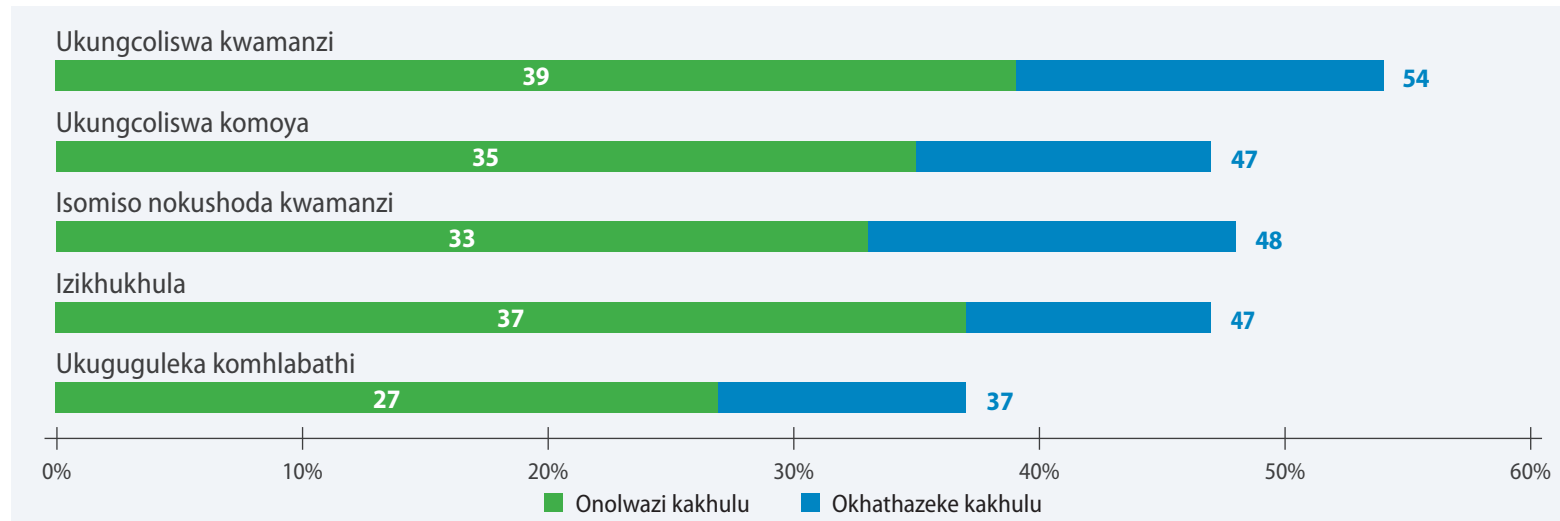
- Ababebancane,
- Othole imfundo yakamuva,
- Oke wathola ukwesekwa kwemfundo yasekhaya ephakeme, kanye
- Abebephuma emakhaya asezingeni eliphezulu lezomnotho (SES).

Abantu abadala abamhlophe nabamaNdiya/base-Asia babanolwazi oluphakeme lwe-S&T; kuyilapho abantu abadala abamhlophe, abaNsundu base-Afrika, namaNdiya/Abase-Asia babenesithakazelo esikhulu.

# 5 Ulwazi lomphakathi kanye nokukhathazeka ngezenzakalo zemvelo

Imiphumela yokuguquka kwesimo sezulu kanye nezigaba ezingezinhle kwezemvelo kuyizinto ezikhathaza umhlaba wonke kanye neNingizimu Afrika. Abantu abadala abaningi babike ukuthi 'bakhathazeke kakhulu' ngalezi zehlakalo zemvelo kunokuba babe nolwazi 'kakhulu' ngemicimbi.

## Amaphesenti abantu abadala 'ababenolwazi kakhulu' futhi 'abakhathazeke kakhulu' ngezenzakalo zemvelo



### Abathathu kwabane

kubantu abadala ababenolwazi oluthile nokukhathazeka mayelana nezenzakalo zemvelo



### ULWAZI OKUPHEZULU KANYE NOKUKHATHAZEKA Izenzakalo yezemvelo

47% Ukukhathazeka

34% Ulwazi



### Izici zalabo abanolwazi oluphakeme nokukhathazeka mayelana nezenzakalo zemvelo

- Isilinganiso samaphuzu, ngamaqembu amancane, abephakathi kwama-56 nama-74 (kuyi-100) olwazi lwezemvelo, naphakathi kwama-62 nama-83 okukhathazeka kwemvelo.
- Abantu abadala ababenolwazi oluthe xaxa futhi bekhathazeke ngezenzakalo zemvelo:
  - Abanemfundo yangemuva kwesekondari, futhi wathola ukwesekwa kwemfundo yasekhaya ephakeme,
  - Babevela ezindlini ezicebile ze-SES, futhi
  - Behlala ezindaweni zasemadolobheni ezihlelekile nezisemaphandleni.
- Abantu abadala abaNingizimu Afrika namaNdiya/Abase-Asia babenolwazi oluphakeme mayelana nemicimbi yezemvelo kuyilapho abantu abadala abaNingizimu Afrika, abaNingizimu Afrika base-Afrika, namaNdiya/Abase-Asia babekhathazeke kakhulu ngezenzakalo zemvelo.

# 6

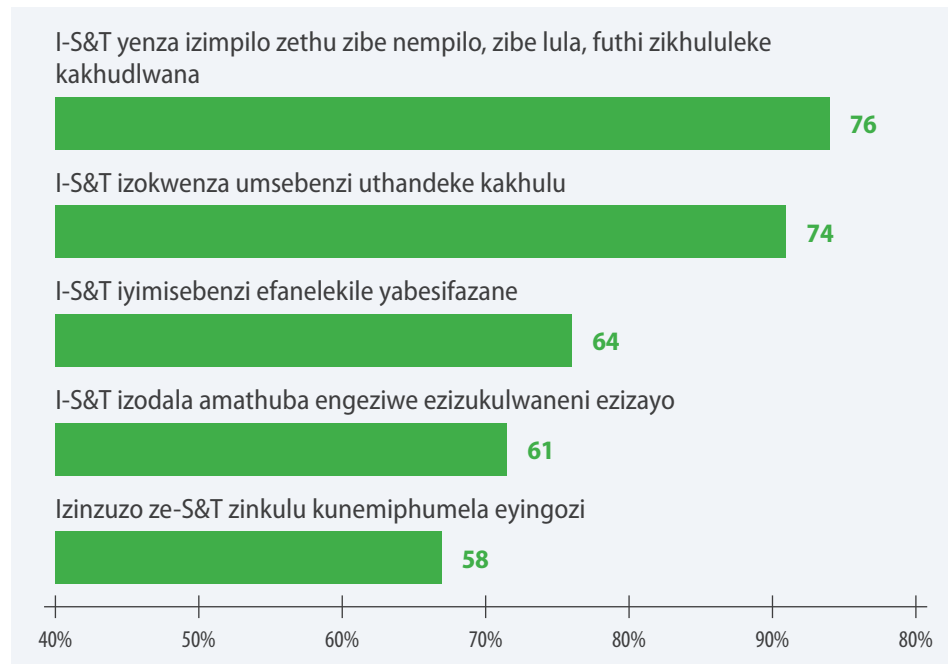
## Isethembiso kanye nezimo zengqondo zokubhuka mayelana ne-S&T yesimanje neyendabuko

Umphakathi uphendule amasethi ezinto ezibuza mayelana nesimo sabo sengqondo sesithembiso (izinzuzo ezingaba khona) kanye nokubhukha (ukukhathazeka, ukwesaba, nezingozi) ezihlobene nesayensi yesimanje neyendabuko. Umphakathi waseNingizimu Afrika uvume kokubili izithembiso kanye nokukhathazeka mayelana ne-S&T.

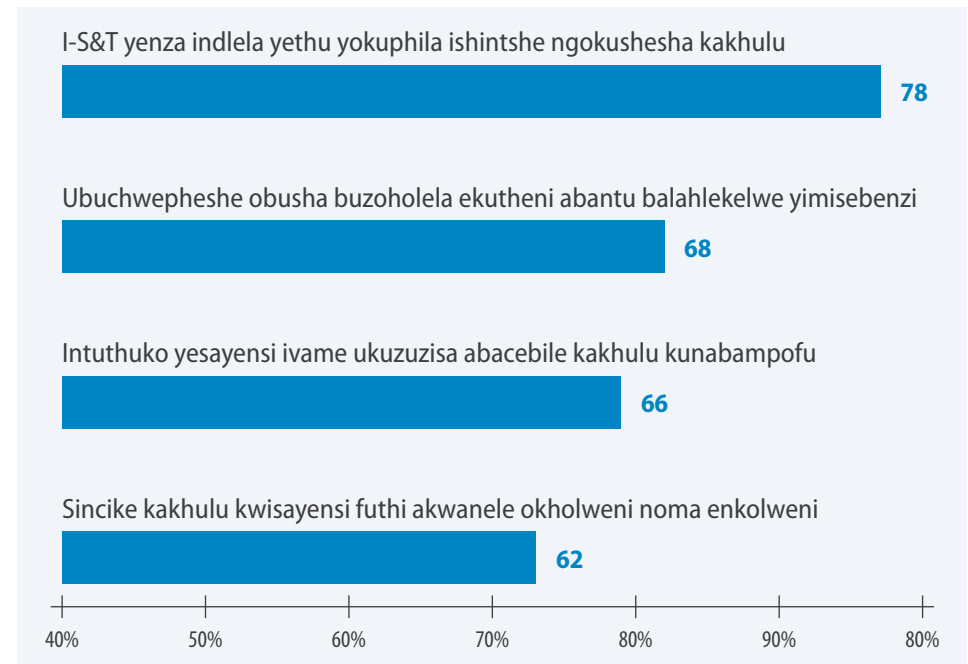
### 6.1 Isethembiso nokubhukha izimo zengqondo mayelana ne-S&T yesimanje

Izinzuzo ezinkulu ezingaba khona ezibikiwe zazihlobene ne-S&T eyenza impilo yansuku zonke ibe nempilo, ibe lula, ibe ntofontofo futhi yenze umsebenzi uthandekake kakhulu; kuyilapho ukukhathazeka okukhulu okuphawulwe kwakumayelana ne-S&T eyenza indlela yethu yokuphila ishintshe ngokushesha futhi ibe negalelo ekwandeni kokungalingani.

#### Isithembiso sesayensi yesimanje (% isivumelwano)



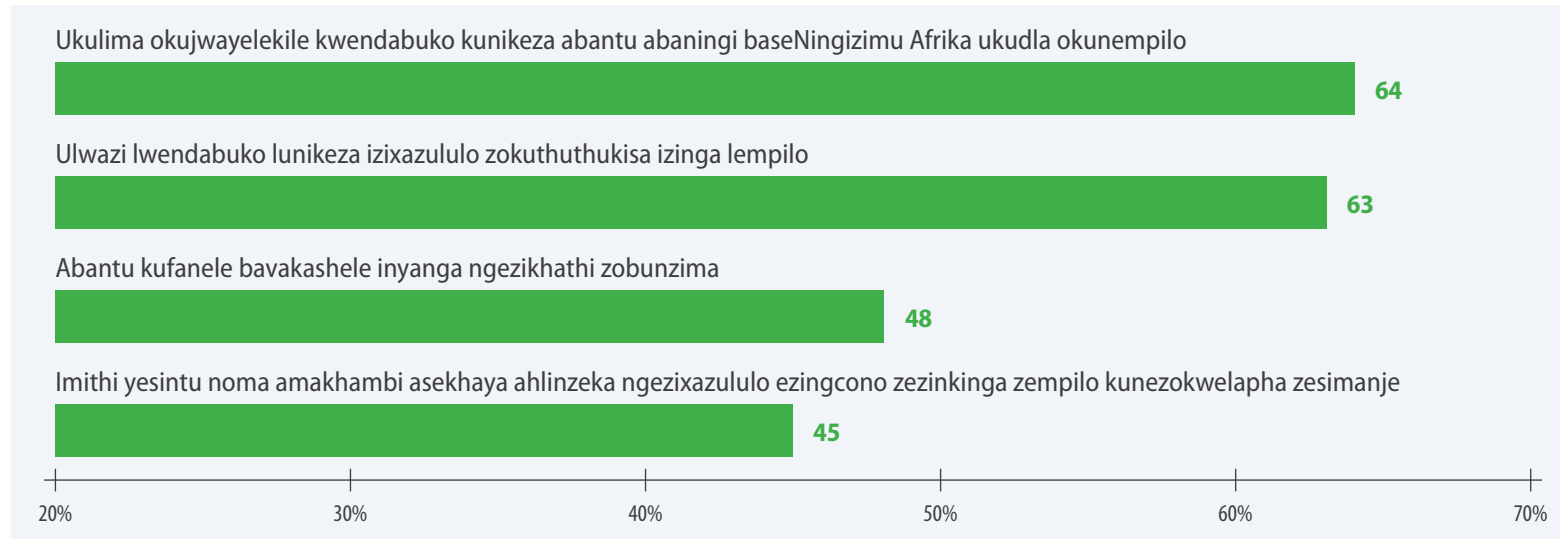
#### Isibalo mayelana nesayensi yesimanje (% isivumelwano)



## 6.2 Isethembiso nokubhukha izimo zengqondo ezibhekiswe ku-S&T yendabuko

Isayensi yendabuko isho ulwazi namakhono adluliselwe ezizukulwaneni ngezizukulwane emphakathini.

### Isithembiso sesayensi yendabuko (% isivumelwano)



Abantu abadala  
**ababili kwabathathu**

baye bavuma izinzuzo zokulima okuncane okungokwesiko nolwazi lwendabuko ekukhiqizweni kokudla

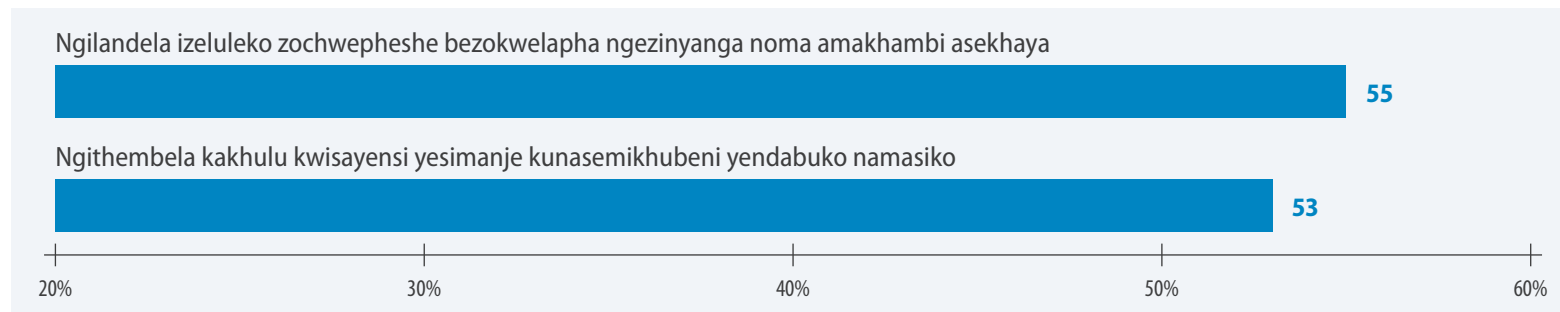


Abahlanu  
**kwabayishumi**

abantu abadala bayalibona iqhaza lezinyanga kanye nemithi yesintu

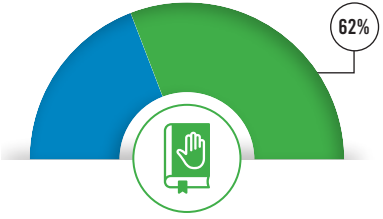
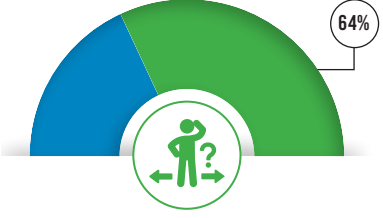
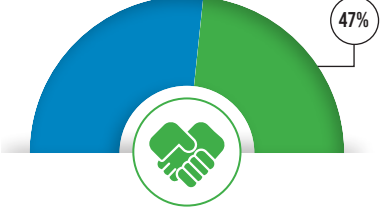


### Isabelo mayelana nesayensi yendabuko ngo-2022 (% isivumelwano)



## 6.3 Ukusatshalaliswa kwezithembiso kanye nezimo zengqondo zokubhuka futhi ababenezithembiso eziphakeme nezimo zengqondo zokubhuka

Kwakukhona izithembiso eziphezulu kanye nezimo zengqondo zokubhuka mayelana nesayensi yesimanje kunesayensi yendabuko. Ngaphezu kwalokho, bekunokwehluka okuncane phakathi kwezithembiso zomphakathi nezimo zengqondo zokubhuka (njengoba kuboniswa umehluko phakathi kwamaphuzu aphezulu naphansi ngamaqembu amancane) ngokuphathelele nesayensi yesimanje kunesayensi yendabuko.



	Amaphesenti abantu abadala abanezimo zengqondo eziqinile	Eziphakeme neziphansi kakhulu amaphuzu (kanye nomehluko)	Obekungenzeka ukuthi babike isithembiso esiphezulu nangaphezulu izimo zengqondo zokubhuka?
Isethembiso maqondana nesayensi yesimanje		62 ku 72 = 10 amaphuzu	Abantu abadala abanemfundo engaphezu kwephansi, imfundo yasekhaya ephakeme ukwesekwa, futhi ababengabafundi noma abafundi ababenezimo zengqondo eziphakeme lesethembiso.
Isabelo maqondana nesimanje isayensi		64 ku 76 = 12 amaphuzu	Abantu abadala abanemfundo engaphezu kwephansi, imfundo yasekhaya ephakeme ukwesekwa, ababebasha, kanye nabantu abadala abamnyama base-Afrika nabamaNdiya/base-Asia babenakho izimo zengqondo eziphezulu zokubhuka.
Isethembiso ezibheke ezesayensi yendabuko		49 ku 70 = 21 amaphuzu	Abantu abadala abathola imfundo ephansi, abavela emakhaya ampofu, Abantu abadala abamnyama base-Afrika nalabo abakhuluma isiTshivenda, isiZulu, nesiTsonga kubika isithembiso esiphezulu se-S&T yendabuko.

## 6.4 Amathrendi ezithembisweni kanye nezimo zengqondo zokubhuka ngokuhamba kwesikhathi



Ezintweni ezifakwe kuzinhlolovo zangaphambili, siqhathanise imiphumela nenhlolovo ye-SAPRS 2022. Ngobubanzi, imiphumela ikhombise ukwenyuka kukho kokubili izithembiso kanye nezimo zengqondo zokubhuka ngokuhamba kwesikhathi kusayensi yesimanje, kodwa ukwehla kwesethembiso kanye nezimo zengqondo zokubhuka mayelana nesayensi yendabuko.

Ushintsho olukhulu kwakuwumbono womphakathi wokukhula kokungalingani ngezimpindulo zesitatimende esithi 'Intuthuko yesayensi ivame ukuzuzisa abacebile kakhulu kunabampofu' ekhuphuka ngamaphesenti ayi-17. Kube nokwehla okuphawulekayo kwenani lomphakathi elivumile ukuthi i-S&T izodala amathuba engeziwe ezizukulwaneni ezizayo. Nakuba kujabulisa ukuqaphela ukuthi iningi lomphakathi manje selithembele kakhulu kukho kokubili isayensi yesimanje kanye nemikhuba yendabuko namasiko, kukhona ukukhathazeka ukuthi umbono wesithembiso sabalimi abancane wehlile.

**QAPHELA:** Izinto ezifakwe umbala oluhlaza zibike ukwenyuka ngokwezibalo kokubukwa kusukela ngo-2013 kuya ku-2022, izinto ezinomthunzi ophuzi azizange zibe nezinguquko ezibalulekile ngokwezibalo, kuyilapho lezo ezisawolintshi ezinombala zibike ukwehla okuphawulekayo kokubuka.

Isayensi yesimanje: Ushintsho olukusuka ku-2013 kuya ku-2022 (Amaphuzu Amaphesenti)		
Intuthuko yesayensi ijwayele ukuzuzisa abacebile kakhulu kunabampofu (R)		+17***
Sincike kakhulu kwisayensi futhi akwanele okholweni noma enkolweni (R)		+7***
I-S&T yenza indlela yethu yokuphila ishintshe ngokushesha kakhulu (R)		+5***
Izinzuzo ze-S&T zinkulu kunemiphumela eyingozi (P)		+9***
I-S&T izokwenza umsebenzi uthandekile kakhulu (P)		+7***
I-S&T yenza izimpilo zethu zibe nempilo, zibe lula, futhi zikhululeke kakhudlwana (P)		0
I-S&T iyimisebenzi efanelekile yabesifazane (P)		-2
I-S&T izodala amathuba engeziwe ezizukulwaneni ezizayo (P)		-11***

Inothi: \*\*\* ngokwezibalo ku-p<.001

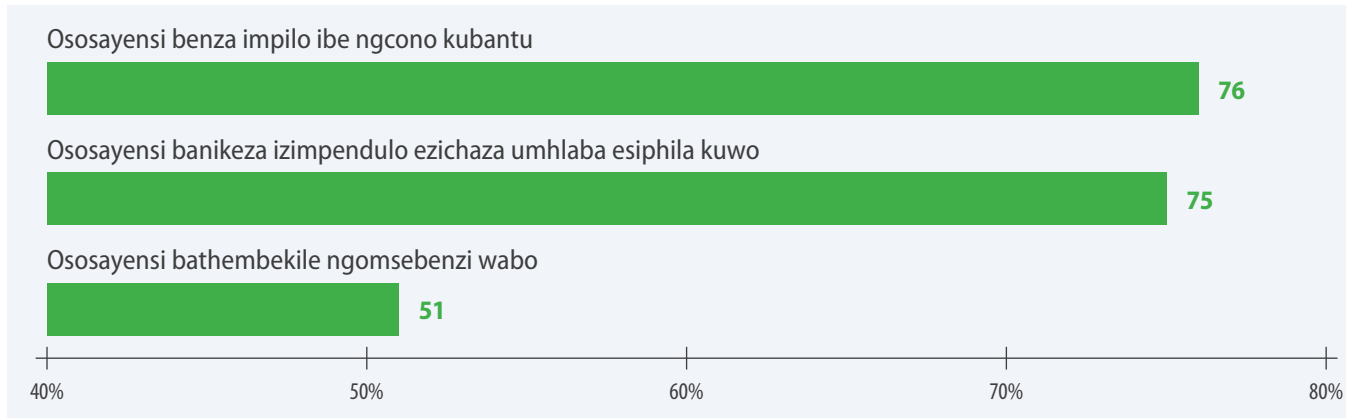
Isayensi yendabuko: Ushintsho olukusuka ku-2009 kuya ku-2022 (Amaphuzu Amaphesenti)		
Ukulima okujwayelekile kwendabuko kunikeza abantu baseNingizimu Afrika ukudla okunempilo (P)		-7***
Ngethemba kakhulu isayensi yesimanje kunezinqubo zendabuko nezamasiko (R)		-18***

Inothi: \*\*\* ngokwezibalo ku-p<.001

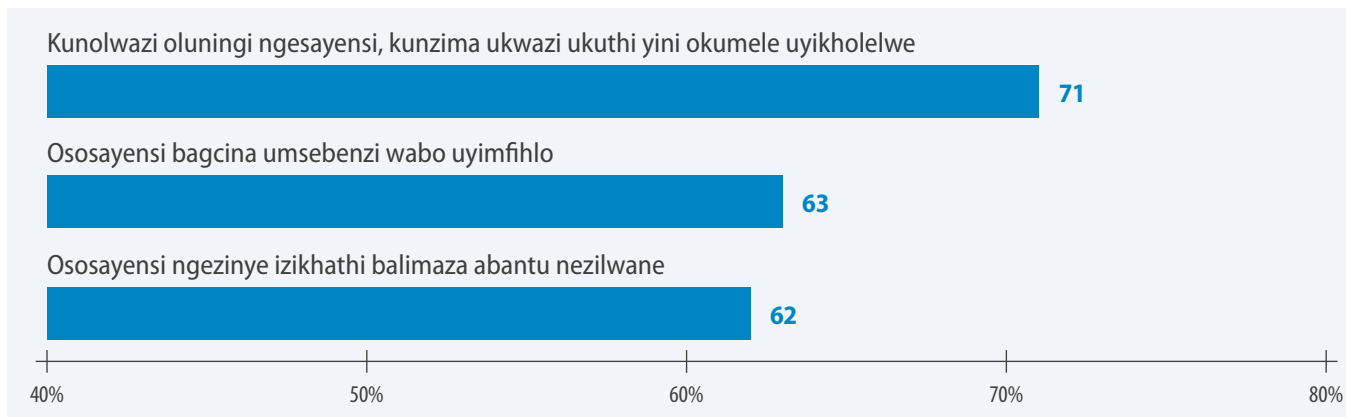
# 7

## Ukuthembela komphakathi emsebenzini wososayensi nolwazi lwesayensi oluvela ezikhungweni

### Isithembiso somsebenzi wososayensi (% isivumelwano)



### Isabelo mayelana nomsebenzi wososayensi (% isivumelwano)



Isayensi nososayensi banikeza ulwazi olusekelwe ebufakazini nezululeko zokuxazulula izinkinga zomphakathi. Ukuze iseluleko samukelwe, umphakathi udinga ukwethemba isayensi nososayensi, futhi uthembele ezikhungweni ezikhiqiza lolo lwazi.

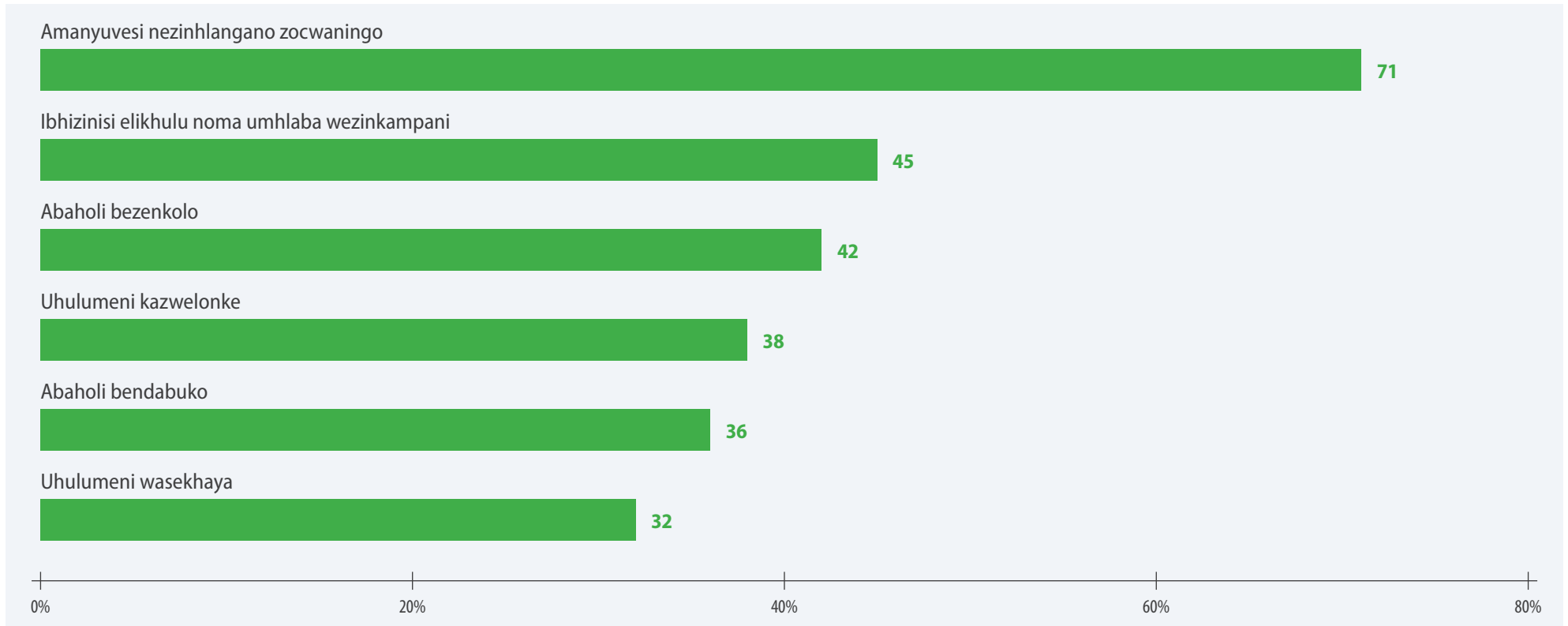


**Abayisikhombisa kubo bonke abantu abadala abayishumi**

**bathembe umsebenzi wososayensi, kanye nolwazi lwe-S&T olunikezwa amanyuvesi nezinhlangano zocwaningo**

Ngesikhathi esifanayo, nokho, amaphesenti aphezulu omphakathi ayenokungabaza mayelana nomsebenzi wososayensi kanye nokuthembela okuphansi olwazini lwe-S&T oluvela kokubili abaholi bezenkolo nezikhungo zikahulumeni (bheka ikhasi elilandelayo).

## Isibindi solwazi lwe-S&T oluvela ezikhungweni ezahlukahlukene (% isivumelwano)



### Ubani owayethembele kakhulu kososayensi kanye nolwazi lwe-S&T oluvela emanyuvesi nezinhlangano zocwaningo?

Umphakathi wawunemibono efanayo, kungakhathaliseki ukwehlukahlukana kwezenhlalo yabantu, ekwethembeni kwawo emsebenzini wososayensi kanye nokuthembela olwazini lwe-S&T oluvela emanyuvesi nezinhlangano zocwaningo.

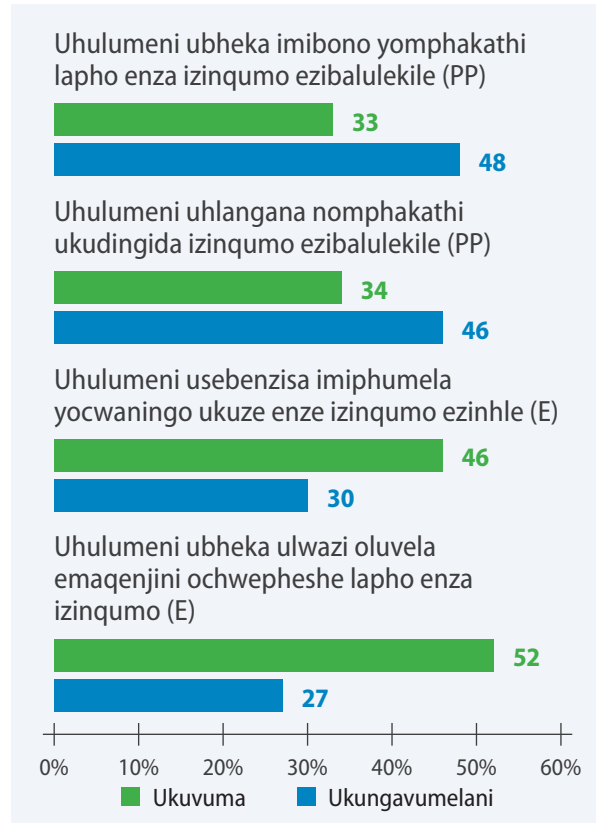
Labo ababethembela kakhulu kososayensi kanye nolwazi lwe-S&T oluvela emanyuvesi nezinhlangano zocwaningo babe:

- Abantu abadala abaphumelele imfundo ephakeme,
- Abantu abadala abanokwesekwa kwemfundo yasekhaya ephakeme,
- Omncane, futhi
- Abafundayo nabafundi.

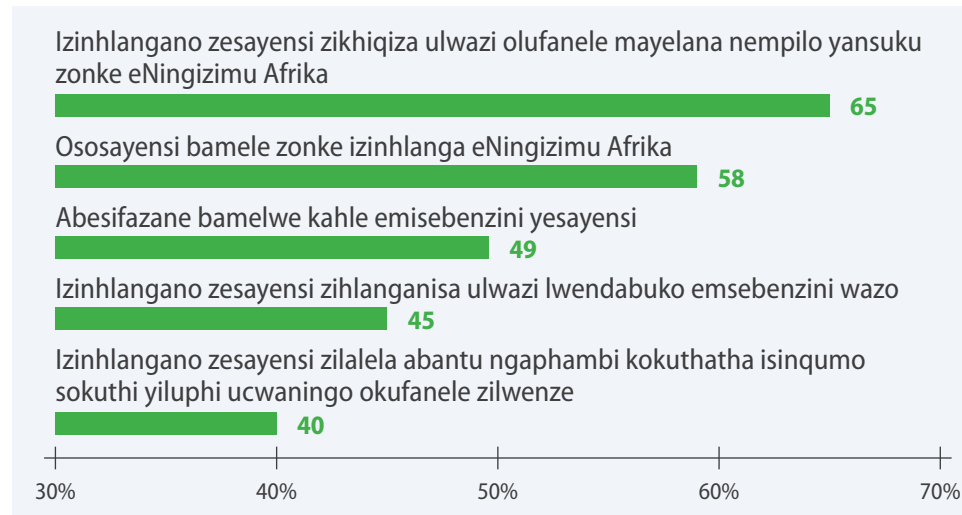
# 8

## Ukuthembela komphakathi ezinqubweni zikahulumeni zokwenza izinqumo kanye nokuguqulwa kwamasiko phakathi kwezinhlangano zesayensi

Ukwethemba ezinqubweni zikahulumeni ezisekelwe ebufakazini (E) kanye nezinqubo zokuthatha izinqumo ezibambe iqhaza (i-PP) (% isivumelwano nokungavumelani)



Amasiko phakathi kwezinhlangano zesayensi ayashintsha (% isivumelwano)



Abathathu kubo bonke abantu abadala abayishumi

babike ukwethemba okukhulu ezinqubweni zikahulumeni zokwenza izinqumo



4 kubantu abadala abayi-10

bavumile ukuthi amasiko ezinhlanganweni zesayensi ayaguquka

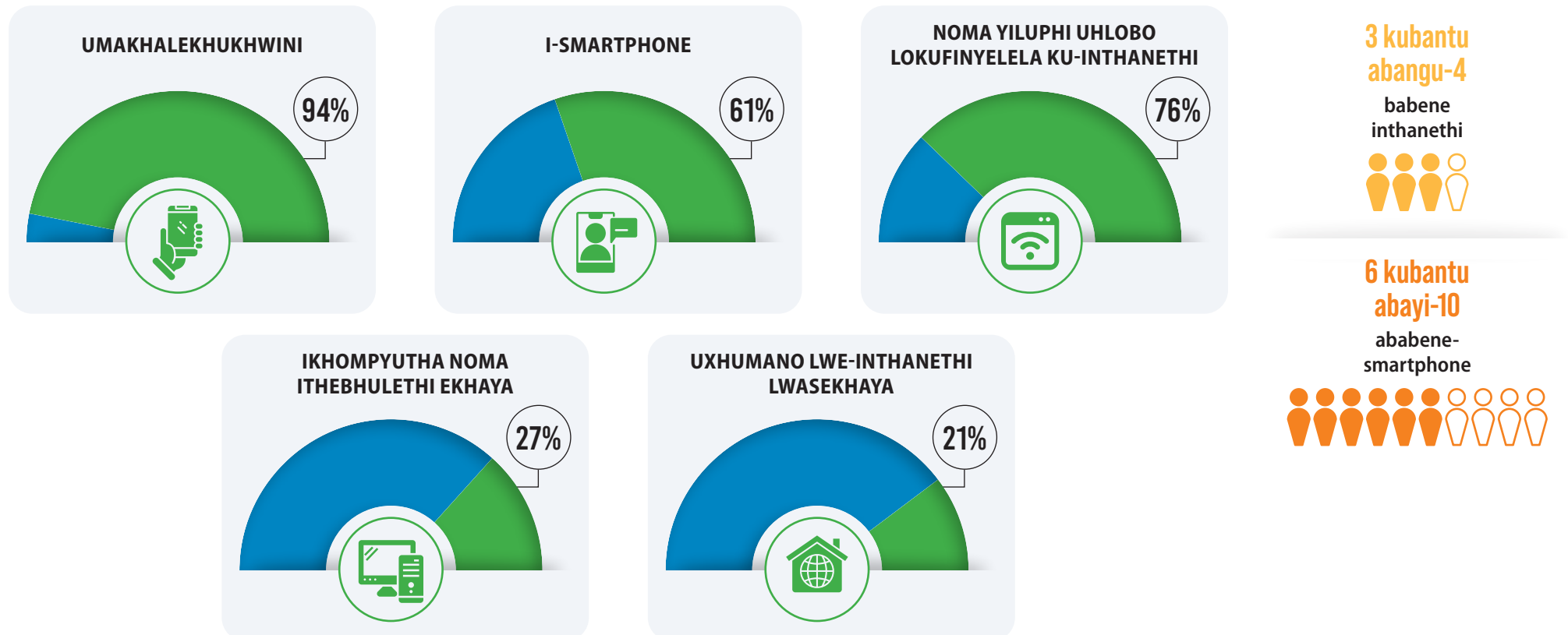


- Kube nokuthembela okuphansi ezinqubweni zikahulumeni zokuthatha izinqumo kanye nokuguqulwa kwamasiko phakathi kwezinhlangano zesayensi.
- Umehluko phakathi kwamaphuzu aphezulu kakhulu naphansi kakhulu, ngeqembu elincane, ekuthembeni ezinqubweni zikahulumeni zokuthatha izinqumo ubungamaphuzu ayi-11; kuyilapho umehluko wesivumelwano sokuthi amasiko ezikhungweni zesayensi ayashintsha wawumngcingo 8 amaphuzu.
- Abantu baseNingizimu Afrika bathambekele ekwamukeleni imibono efanayo mayelana nokuthathwa kwezinqumo kukahulumeni kanye nokuguqulwa kwamasiko ezindaweni zokusebenza zesayensi, kungakhathaliseki ukuthi banemvelaphi ehlukahlukene.
- Abantu abadala abamnyama base-Afrika babathembele kakhulu ezinqubweni zikahulumeni zokwenza izinqumo kanye nokuvumelana okuphezulu mayelana nezinguquko zamasiko phakathi kwezinhlangano zesayensi.

# 9 Ulwazi lwe-S&T: Ukufinyelela, ukuchayeka, ukusetshenziswa, nokwethenjwa

Ubudlelwano obunempilo phakathi kwesayensi nomphakathi buncike ekwabelaneni kolwazi lwe-S&T nokuqinisekisa ukuthi umphakathi ungafinyelela futhi wethembe lolu lwazi. Ukufinyelela komphakathi ezinsizakalweni zedijithali kanye ne-inthanethi kudlala indima ebalulekile ekuzivumeleni ukuthi zifinyelele ulwazi.

Ngo-2022, ukufinyelela kwedijithali kanye ne-inthanethi kwaba kanje:



## 9.1 Amaphethini wokufinyelela nokusetshenziswa kwe-inthanethi

Oyedwa kwabane abantu abadala



ubengenayo i-inthanethi

Oyedwa kubo bonke abantu abadala abathathu



usebenzisa i-inthanethi njalo (ngaphezu kwamahora amane izinsuku eziningi)

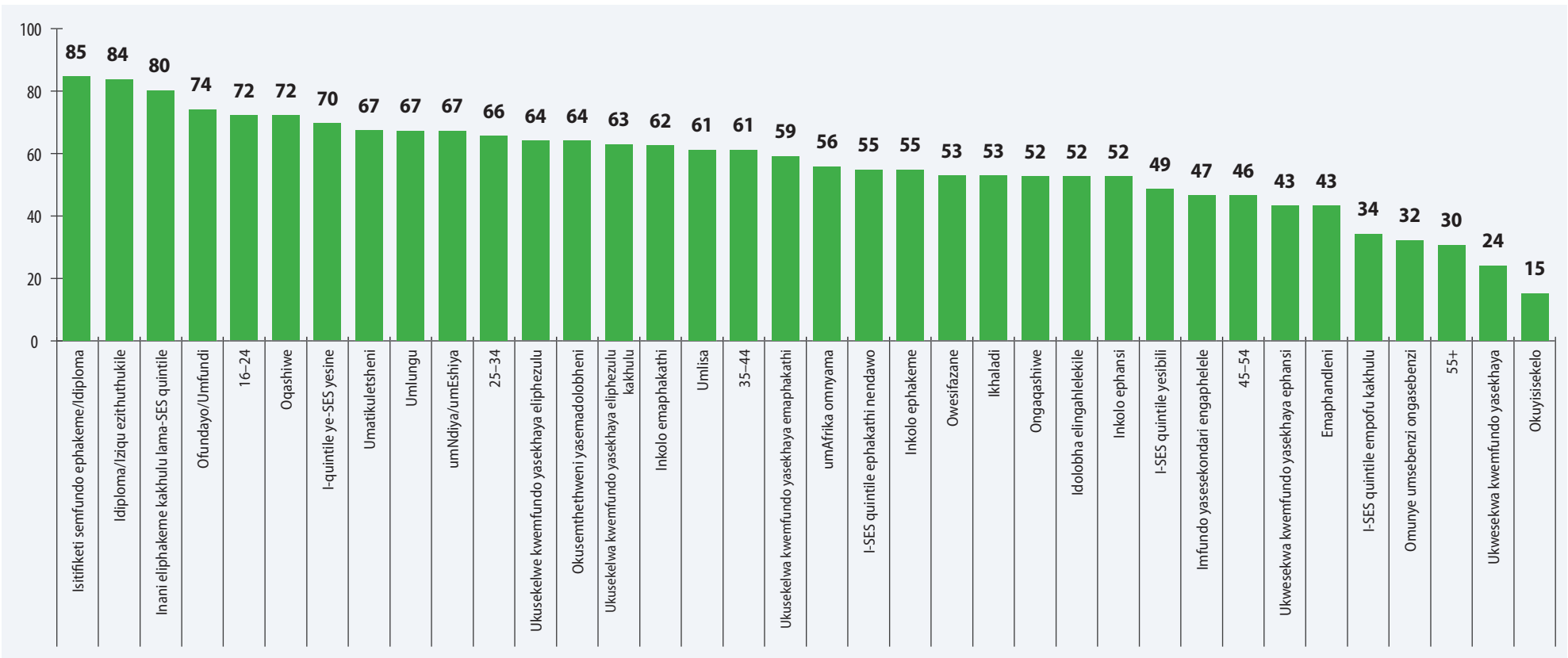
Ukusetshenziswa kwansuku zonke kwe-inthanethi kwahluka kakhulu, kusukela kwaphezulu okungama-85% kulabo abanemfundo ephakeme kuya kwephansi ngo-15% kulabo abanemfundo yamabanga aphansi kuphela.

### Ubani obesebenzisa i-inthanethi ephakeme?

Labo abasebenzisa i-inthanethi okuphezulu babe:

- Abantu abadala abaphumelele imfundo ka-matric nangaphezulu, kanye nokwesekwa kwemfundo yasekhaya ephakeme,
- Abancane, Abafundi, abafundi, kanye nabasebenzi, Kusuka ezindlini ezicebile ze-SES, kanye Abantu abadala abamhlophe nabamaNdiya/base-Asia.

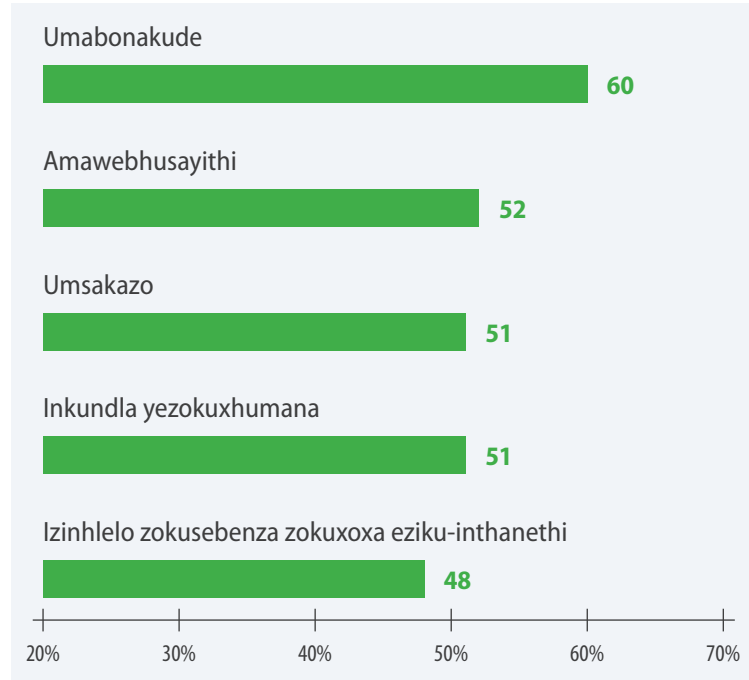
### Iphethini yokusetshenziswa kwe-inthanethi nsuku zonke ngezici zenhlalo yabantu (%)



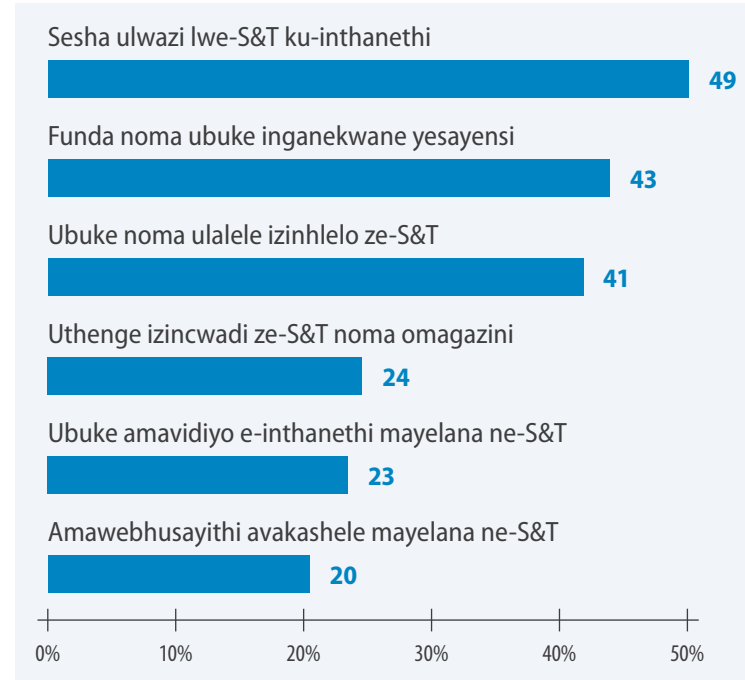
## 9.2 Ukuchayeka nokusetshenziswa kolwazi lwe-S&T

Ulwazi lubalulekile ekuthathweni kwezinqumo futhi lungase lube nomthelela ezenzweni nasekuziphatheni. Umphakathi ubike ukuthi uchayeke (ukwamukela) nokusebenzisa (ukufinyelela ngokusebenzayo) amanani aphansi olwazi lwe-S&T.

### Imithombo edume kakhulu yezindaba ze-S&T (% okungenani maviki onke)



### Izindlela ezaziwa kakhulu zokusetshenziswa kolwazi lwe-S&T (% okungenani kwesinye isikhathi)



- Kube nokuhluka okubanzi kwamaphuzu okuchayeka nokusetshenziswa kolwazi lwe-S&T ngamaqembu angaphansi, anamabanga asuka ku-22 kuye ku-51 kwangu-100 okuthola ulwazi, kanye nama-27 kuya ku-47 ukuze kusetshenziswe ulwazi.
- Labo abachayeke, futhi basetshenziswa, ulwazi olwengeziwe lwe-S&T:
  - Babe nokuthola imfundo ephakeme,
  - Babenokusekelwa kwemfundo ephakeme yasekhaya, futhi
  - Babebancane, abafundi kanye nabafundi.

Ababili kubo bonke abantu abadala abayishumi

bathole amanani aphezulu olwazi lwe-S&T



Umuntu oyedwa kubo bonke abantu abadala abangu-20

uthathe amanani aphezulu olwazi lwe-S&T



**UMTHOMBO OWADUMELE KAKHULU WOLWAZI LWE-S&T**

Umabonakude

**60%**



**INDLELA EDUMILE KAKHULU YOKUFINELELA NGOKUSEBENZAYO ULWAZI LWE-S&T**

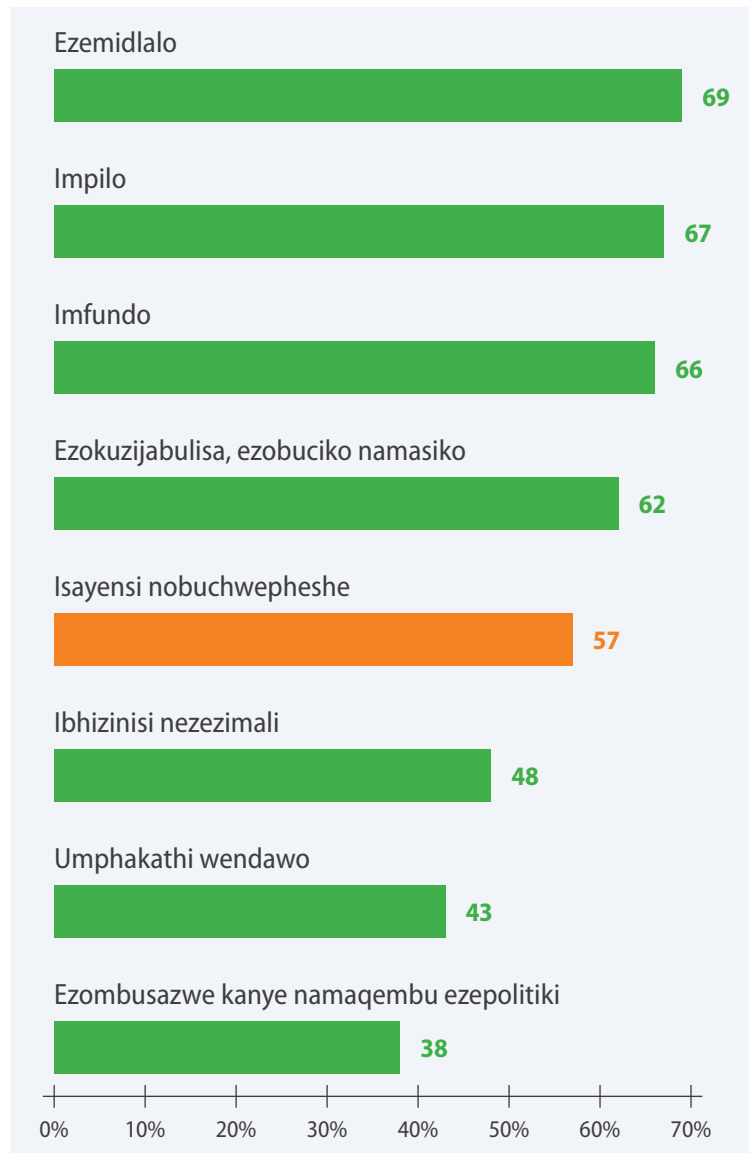
Ukusesha kwi-inthanethi

**49%**

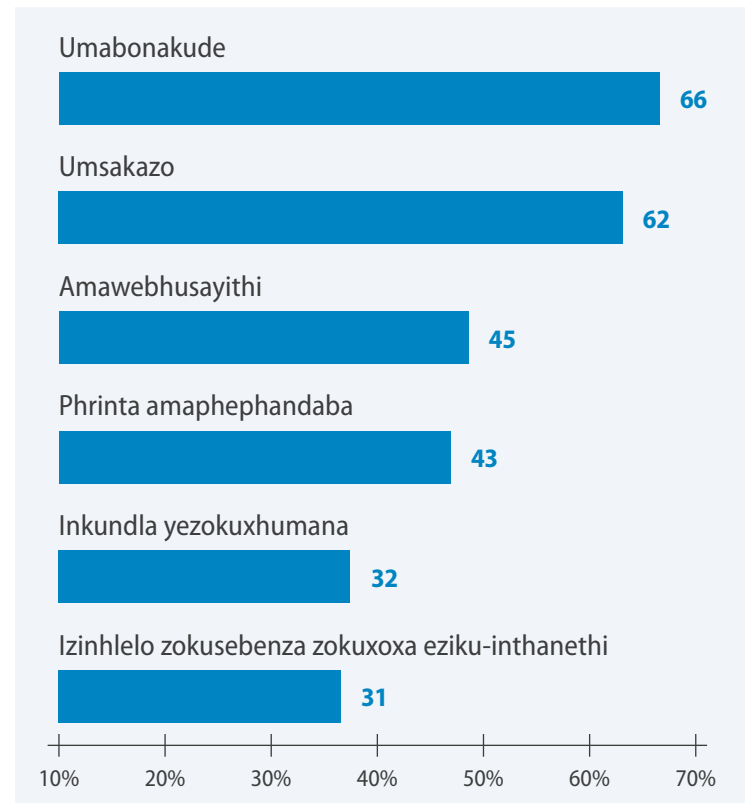


## 9.3 Thembela kokuqokethwe kwezindaba nemithombo yolwazi

Thembela kokuqokethwe kwezindaba (%)



Ukuthembela emithonjeni yolwazi ye-S&T (%)



- Kungakhathalekile isizinda sabo esihlukile, abantu baseNingizimu Afrika bavame ukuba namazinga afanayo okwethemba emithonjeni yezindaba ye-S&T.
- Labo ababethembela kakhulu emithonjeni yezindaba ye-S&T kwakungabantu abadala abanemfundo eyengeziwe, ukusekelwa kwemfundo yasekhaya ephakeme, nalabo ababebancane, abafundi, abafundi, kanye nabangasebenzi.

Abesithupha kubantu abadala abayishumi

banelisekile ngendlela abezindaba ababike ngayo izindaba ze-S&T



IZINGA ELIPHEZULU LOKUTHEMBA OKUQOKETHWE IZINDABA

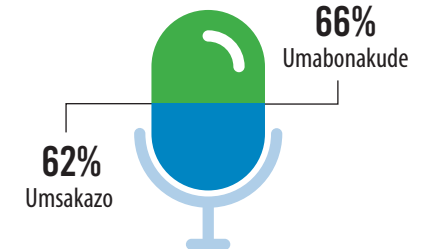
Ezemidlalo

69%



IMITHOMBO YOLWAZI ESITHEMBELWE KAKHULU

Umabonakude nomsakazo



# 10 Imiphumela yokubandakanya isayensi: Imisebenzi kanye nokuziphatha

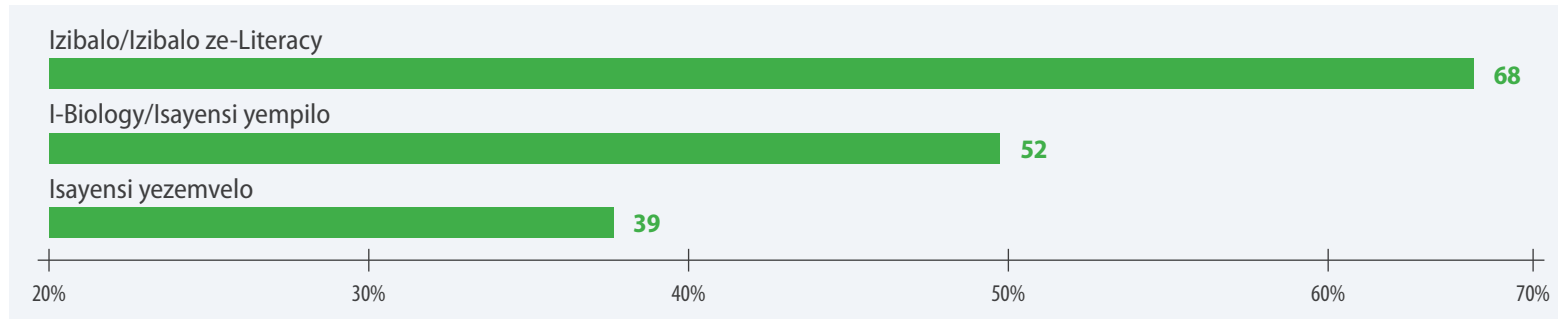
Abaphendulile ocwaningweni babuzwa ukuthi ngabe babambe iqhaza yini emisebenzini ehlukahlukene ehlobene ne-S&T noma imicimbi, njengoba ukwenza kanjalo kukhombisa ukuziphatha kwabo kwesayensi. Imisebenzi noma imicimbi ihlukaniswe yaba izinhlobo ezinhlanu ezibanzi zokubandakanya: ukuzibandakanya kwezemfundo, ukusebenzelana okusekelwe ekuheheni, ukusebenzelana okusekelwe emphakathini, ukubandakanyeka kokwabelana ngolwazi, nokuzibandakanya komuntu siqu nezinhlelo zokusebenza eziku-inthanethi.



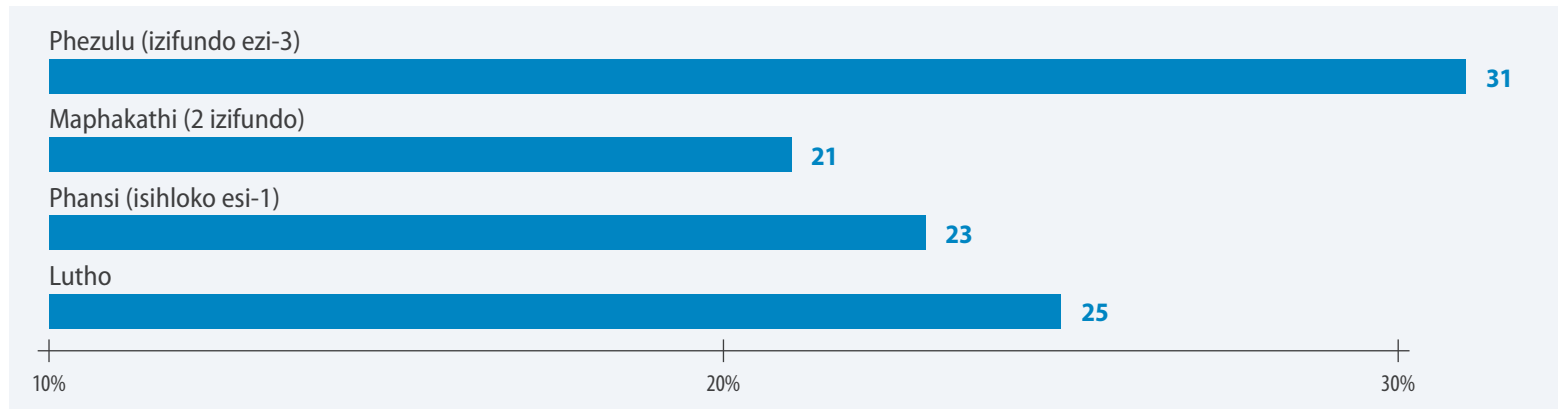
## 10.1 Ukuzibandakanya kwezemfundo: Izinga lokuchayeka ezifundweni ze-STEM esikoleni

Ulwazi lwesayensi nezimo zengqondo ngesayensi kuhlobene. Abaphenduli kwinqubo ye-SAPRS babike ngezifundo ze-STEM abazikhethela ukuzifunda esikoleni ngemva kweBanga lesi-9.

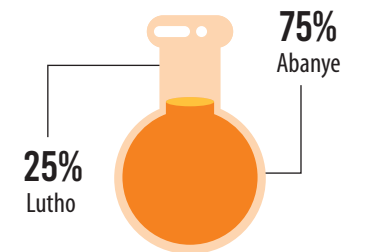
### Ukuchayeka ezifundweni ze-STEM ngemva kweBanga lesi-9 (%)



### Ukuvezwa Kwenkomba ye-STEM (%)



Ukuchayeka kunoma yiziphi izifundo ze-STEM ngemva kweBanga lesi-9



### Abathathu kubo bonke abantu abadala

beyishumi babene-STEM ephezulu yokuchayeka, bethatha zonke izifundo ezintathu ze-STEM ezibuzwe ngazo ngemva kweBanga 9




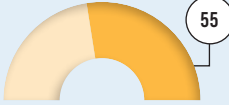


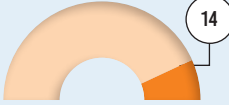










Labo abanokuchayeka okuphezulu kwe-STEM:

- Baba namazinga aphezulu okuzuzwa kwezemfundo kanye nokwesekwa kwemfundo yasekhaya ephakeme,
- Bavela ezindlini eziphezulu ze-SES,
- Babebancane, abafundi, abafundi, nabaqashiwe, kanye
- Kungenzeka kube ngabantu abadala abamhlophe.

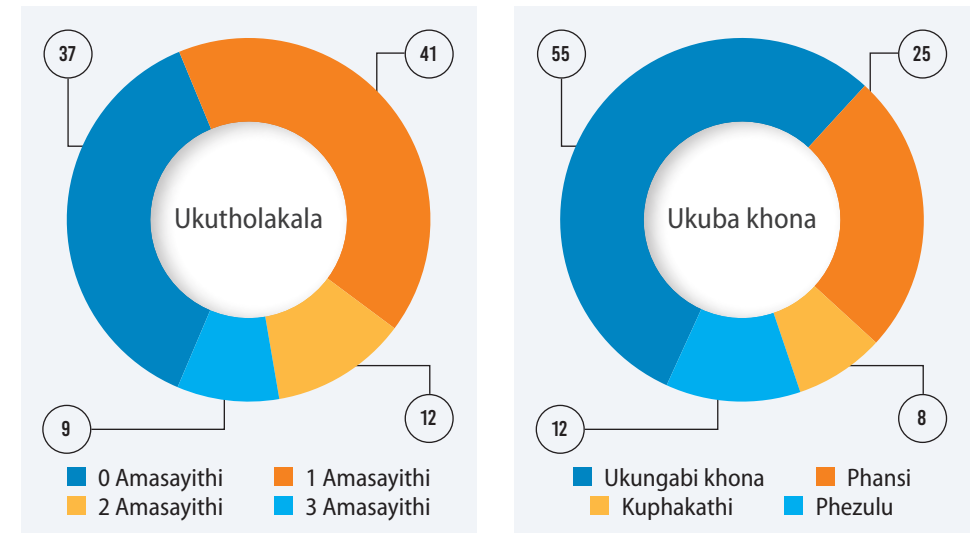
## 10.2 Ukuhlanganyela okusekelwe ekuheheni: Ukutholakala nokuba khona kumasayithi e-S&T

Abaphenduli kwinhlolovo ye-SAPRS babike ngokutholakala kwezindawo ze-S&T nemisebenzi ezindaweni zabo nokuthi bake bazivakashela yini. Ngaphezulu nje kokukodwa kokuthathu komphakathi (37%) babengenazo iziza ze-S&T, njengemitapo yolwazi, iminyuziyamu noma izikhungo ze-S&T eduze kwamakhaya abo, kuyilapho abangaphezudlwana kwengxenye (55%) bengazange baye kunoma yiziphi iziza ze-S&T noma imicimbi.

Ukutholakala nokuba khona kwezindawo ze-S&T nemisebenzi (%)

	Amasayithi e-S&T nemisebenzi	Available in area	Attended
	Umtapo wolwazi womphakathi	 55	 30
	Imisebenzi yesayensi yomphakathi, isib. ukuhlanza, ukuhamba kwemvelo	 14	 18
	Imyuziyamu	 12	 23
	Ingadi yezitshalo, imvelo noma isiqiwu, i-zoo, i-aquarium	 10	 26
	Isikhungo Sesayensi Nobuchwepheshe noma uMbukiso	 7	 16

Ukutholakala nokuba khona kwezindawo ze-S&T nemisebenzi (%)

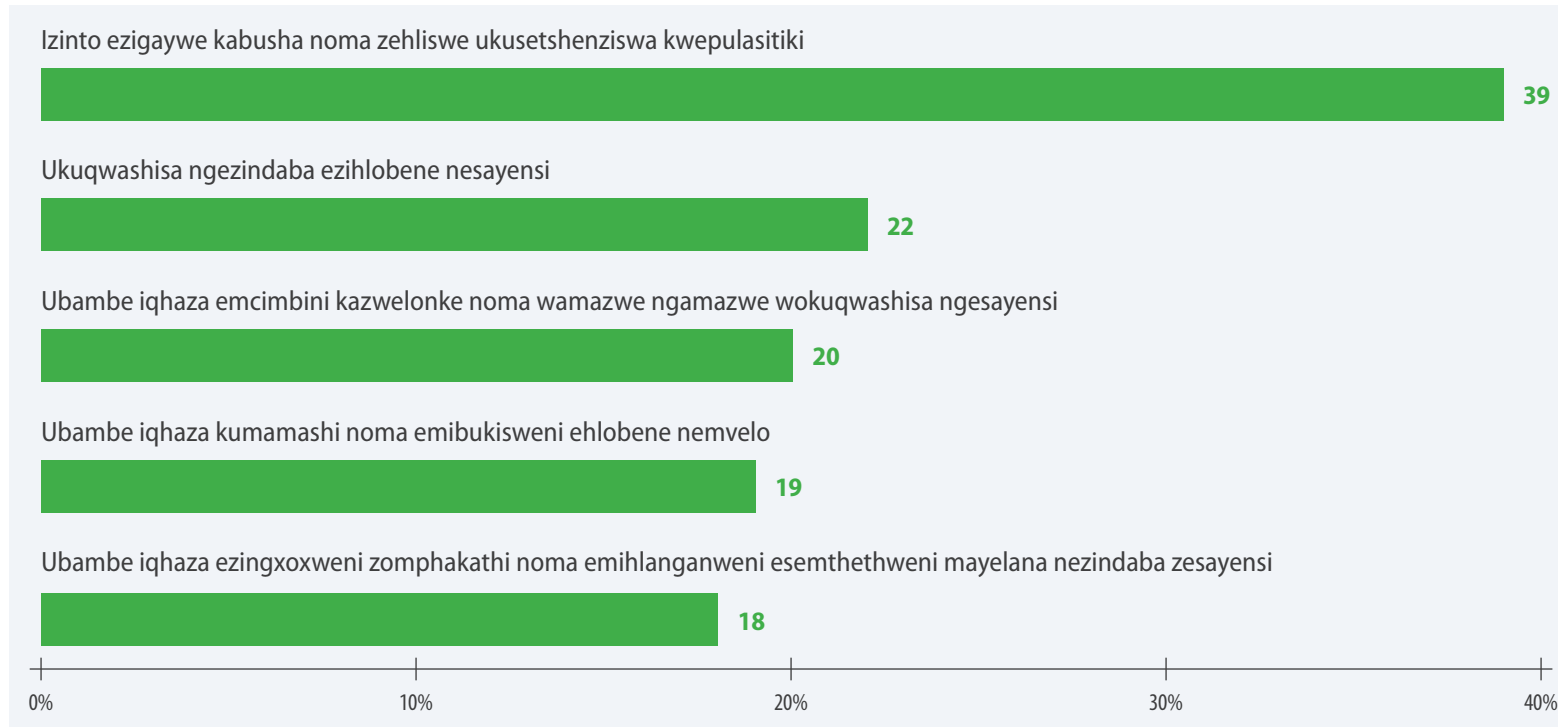


### Labo okungenzeka bahambele imicimbi ye-S&T nemisebenzi:

- Uthole u-matric nangaphezulu, kanye nokwesekwa kwezemfundo yasekhaya ephakeme,
- Bavela ezindlini eziphezulu ze-SES,
- Bebhala ezindaweni zasemadolobheni ezihlelekile nezingahlelekile,
- Bebhengabasebenzi, abafundi nabafundi,
- Bahlala eduze amasayithi e-S&T, futhi bachayeka futhi basebenzisa ulwazi olwengeziwe lwe-S&T.

## 10.3 Ukuzibandakanya komphakathi

### Ibambe iqhaza emisebenzini yesayensi esekwe emphakathini (% okungenani ngezinye izikhathi)



### Umuntu oyedwa kwabayi sikhombisa

ubike ukuthi imisebenzi yesayensi yomphakathi efana nokuhlazwa komphakathi nokuhambela imvelo iyatholakala endaweni yabo



### Umuntu omdala oyedwa kwabayi-10

uvame ukubamba iqhaza emisebenzini esekwe emphakathini



### UMSEBENZI OVAMILE KAKHULU

Izinto zokwakha kabusha noma ukunciphisa ukusetshenziswa kwepulasitiki



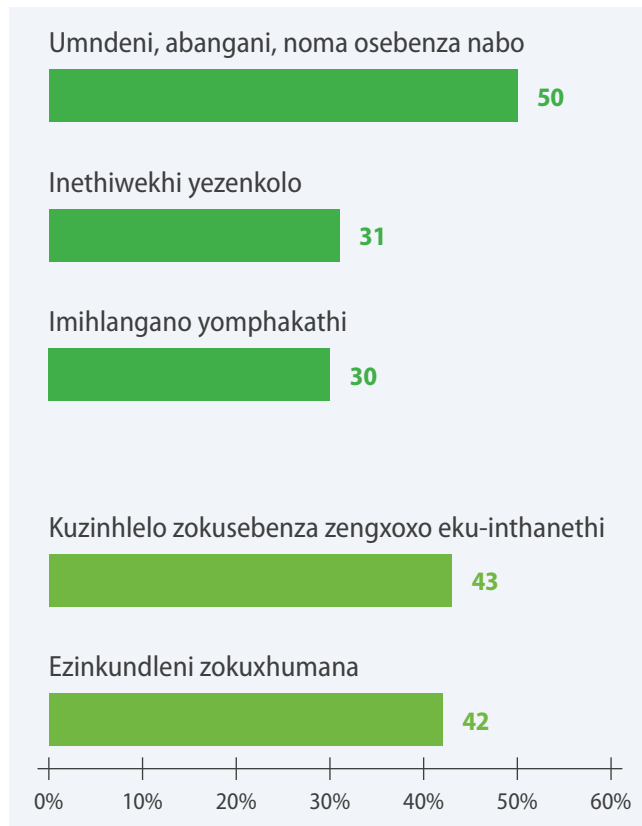
#### Ubani owaba neqhaza eliphezulu ekuxoxisaneni nomphakathi?

- Umehluko kumaphuzu amaphakathi, ngamaqembu amancane, ubuyibanga elibanzi ukusuka ku-8 kuye ku-33.
- Labo okungenzeka ukuthi babe neqhaza eliphezulu ekuxoxisaneni kwesayensi okusekelwe emphakathini kwaba:
  - Abantu abadala abaphumelele umatikuletshehi nangaphezulu,
  - Abaqashiwe, abafundi, nabafundi, kanye
  - Labo abahlala kuzo zombili izindawo ezisemadolobheni ezihlelekile nezingahlelekile.

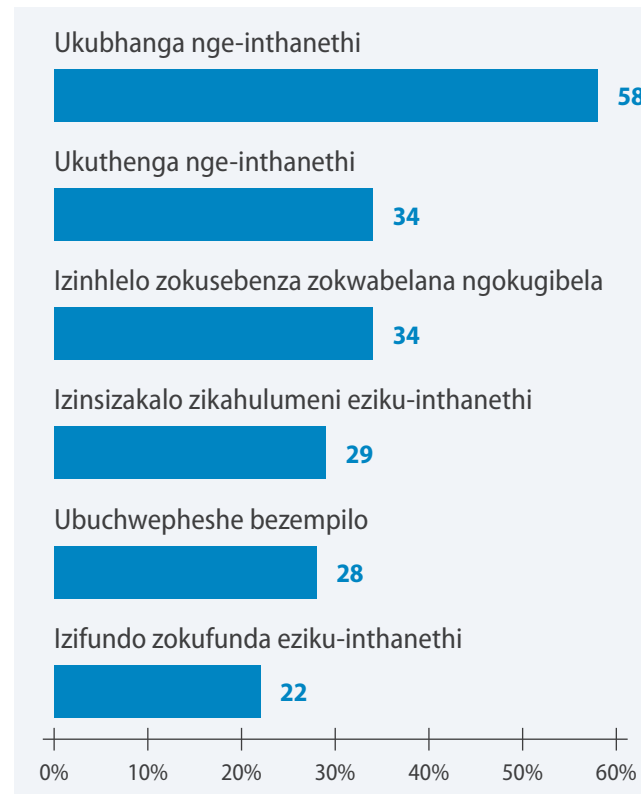
## 10.4 Ukwabelana ngolwazi nokuzibandakanya nezinhlelo zokusebenza eziku-inthanethi

Ngokungeziwe ekutholeni ulwazi lwe-S&T, umphakathi wabelane ngolwazi, kanye nezinhlelo zokusebenza ezisetshenziswa ku-inthanethi. Kube namaleveli aphansi okwabelana ngolwazi, kanye nokusetshenziswa kwezinhlelo zokusebenza eziku-inthanethi phakathi komphakathi. Umphakathi wabelana ngolwazi lwe-S&T ngokuvamile nomndeni, abangani, noma ozakwabo; futhi uhlelo lokusebenza lwe-inthanethi olusetshenziswa kakhulu kwakuwukubhanga nge-inthanethi.

### Ukwabelana ngolwazi: kanjani futhi nobani (% okungenani ngezinye izikhathi)



### Ukusetshenziswa kwezinhlelo zokusebenza eziku-inthanethi ezikhethiwe (% okungenani ngezinye izikhathi)



## Babili kubantu abadala abayishumi

babelane ngolwazi futhi basebenzise izinhlelo zokusebenza ze-inthanethi njalo



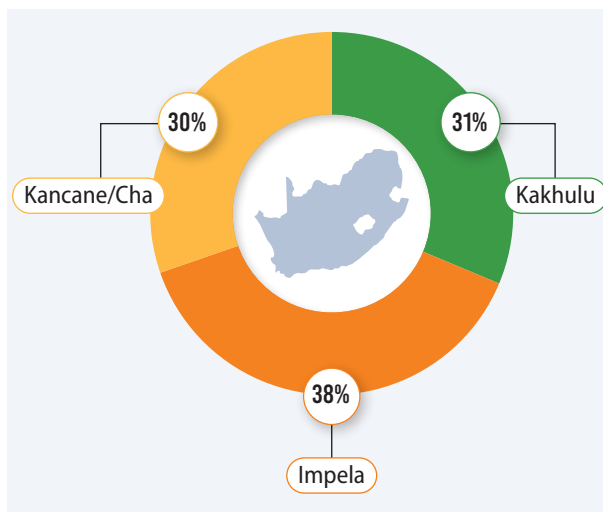
- Kube nokuhluka okubanzi kwamaphuzu, ngamaqembu amancane, ngokwabelana ngolwazi olusuka ku-18 kuye ku-46, kanye nokusetshenziswa kwezinhlelo zokusebenza eziku-inthanethi ezisuka ku-11 kuye ku-56, zombili kweziyi-100.
- Labo ababelana ngolwazi olwengeziwe futhi babike ukusetshenziswa okuphezulu kwezinhlelo zokusebenza eziku-inthanethi kungenzeka ukuthi:
  - Ukuthola imfundo ephakeme kanye nokwesekwa kwezemfundo yasekhaya ephakeme,
  - Babe ne-SES ephezulu,
  - Babebancane, baqashwe, abafundi, nabafundi, kanye
  - bahlala ezindaweni zasemadolobheni ezihlelekile nezingahlelekile.
- Abantu abadala abamnyama base-Afrika kungenzeka ukuthi babelane ngolwazi, kuyilapho abantu abadala base-India/Asia nabaMhlophe bevame ukubika ukusetshenziswa okuphezulu kwezinhlelo zokusebenza ezikhethiwe ze-inthanethi.

# 11 Imibono yokuziqhenya, isithembiso, kanye nezinto ezibalulekile mayelana nohlelo lukazwelonke lokusungula izinto ezintsha

## 11.1 Ukuziqhenya ngezimpumelelo ze-S&T zaseNingizimu Afrika

Umphakathi oqaphela isayensi usekelwa yizindinganiso ezihlanganisa futhi zisekele uhlelo lukazwelonke lokusungula izinto ezintsha. Nakuba abayisikhombisa kwabayi-10 abantu abadala 'babeziqhenya kakhulu' noma 'beziqhenya' ngempumelelo ye-S&T yaseNingizimu Afrika, babeneqiniso ngalezo zinzuzo uma ziqhathaniswa nezinye izifunda zomhlaba, nekota eyodwa kuphela eyayivuma ukuthi iNingizimu Afrika yayingcono kune-Europe kanye neMelika eseNyakatho.

### Uziqhenya kangakanani ngezimpumelelo ze-S&T zaseNingizimu Afrika (%)?



### Ingakanani impumelelo ye-S&T yaseNingizimu Afrika uma iqhathaniswa nezinye izifunda zomhlaba?

INingizimu Afrika ingcono kune ...		Amaphesenti avumayo
	Ezinye izingxenywe ze-Afrika	67%
	IYurophu neNyakatho Melika	25%
	Amazwe ase-Asia	18%

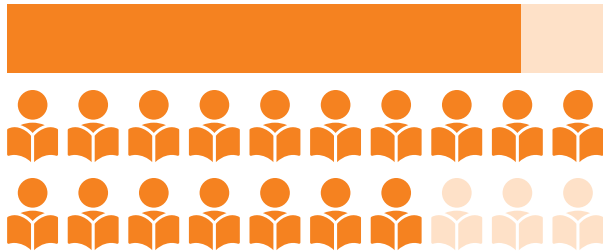
- Isilinganiso samaphuzu, ngamaqembu angaphansi, ahluka phakathi kwebanga eliphansi nelincane eliphakathi kwama-24 nama-40 kwangu-100 ngokuziqhenya okuphezulu, futhi phakathi kwama-30 nama-41 kwangu-100 alabo ababheke impumelelo ye-S&T yaseNingizimu Afrika njengezingcono kunalezo zizonke. ezinye izifunda. Lokhu kusho ukuthi abantu baseNingizimu Afrika bathambekela ekubeni nesimo sengqondo esicishe sifane sokuziqhenya ngezimpumelelo ze-S&T, kungakhathaliseki ukuthi banemvelaphi ehlukehluke.
- Labo ababike ukuziqhenya okuphezulu ngezimpumelelo ze-S&T kwakungabantu abadala abamnyama base-Afrika, labo abaphumelele imfundo ephakeme, labo abathole ukwesekwa okwengeziwe ngemfundo yasekhaya, kanye nabafundi nabafundi.
- Labo ababuka impumelelo ye-S&T yaseNingizimu Afrika njengezingcono kunalezo zakwamanye amazwe kwakungabantu abadala abamnyama base-Afrika, labo abathola imfundo ephansi namazinga aphezulu okusekelwa ngemfundo yasekhaya, kanye nalabo abahlala ezindaweni zasemadolobheni ezingahlelekile.
- Ngokuphambene, labo ababheka impumelelo ye-S&T yaseNingizimu Afrika njengezingcono kunezimpumelelo kwamanye amazwe kwakungabantu abadala baseNdiya/Abase-Asia nabaMhlophe, labo abanemfundo ephakeme, nalabo abahlala emakhaya acebe kakhulu e-SES quintile.

## 11.2 Isithembiso samakhono we-S&T kubantu abasha

Umphakathi ulinganisele kakhulu isithembiso samakhono e-S&T kubantu abasha kakhulu. Lokhu kuthumela umyalezo omuhle kubantu abasha ngokubaluleka kanye nenani lamakhono e-S&T.

Abantu abasha kufanele bakhuthazwe ukuthi bafunde nge-S&T

86



I-S&T ilungiselela abantu abasha ukuthi baphendule ezinselele emiphakathini yendawo

76



### Izici zalabo abalinganisele kakhulu isithembiso samakhono e-S&T

- Abantu baseNingizimu Afrika bathambekele ekubeni nombono omuhle ngesithembiso samakhono e-S&T kubantu abasha, kungakhathaliseki ukuthi banemvelaphi ehluahlukene.
- Labo ababone isithembiso esiphezulu se-S&T babe:
  - Ngaphezu kwemfundo yamabanga aphantsi,
  - Kanye nokwesekwa kwemfundo yasekhaya ephakeme.

Amakhono edijithali nawekhomyutha aya ebaluleka kakhulu entsheni

85



Iziqu ze-S&T zinikeza abantu abasha imisebenzi eminingi kunezinye iziqu

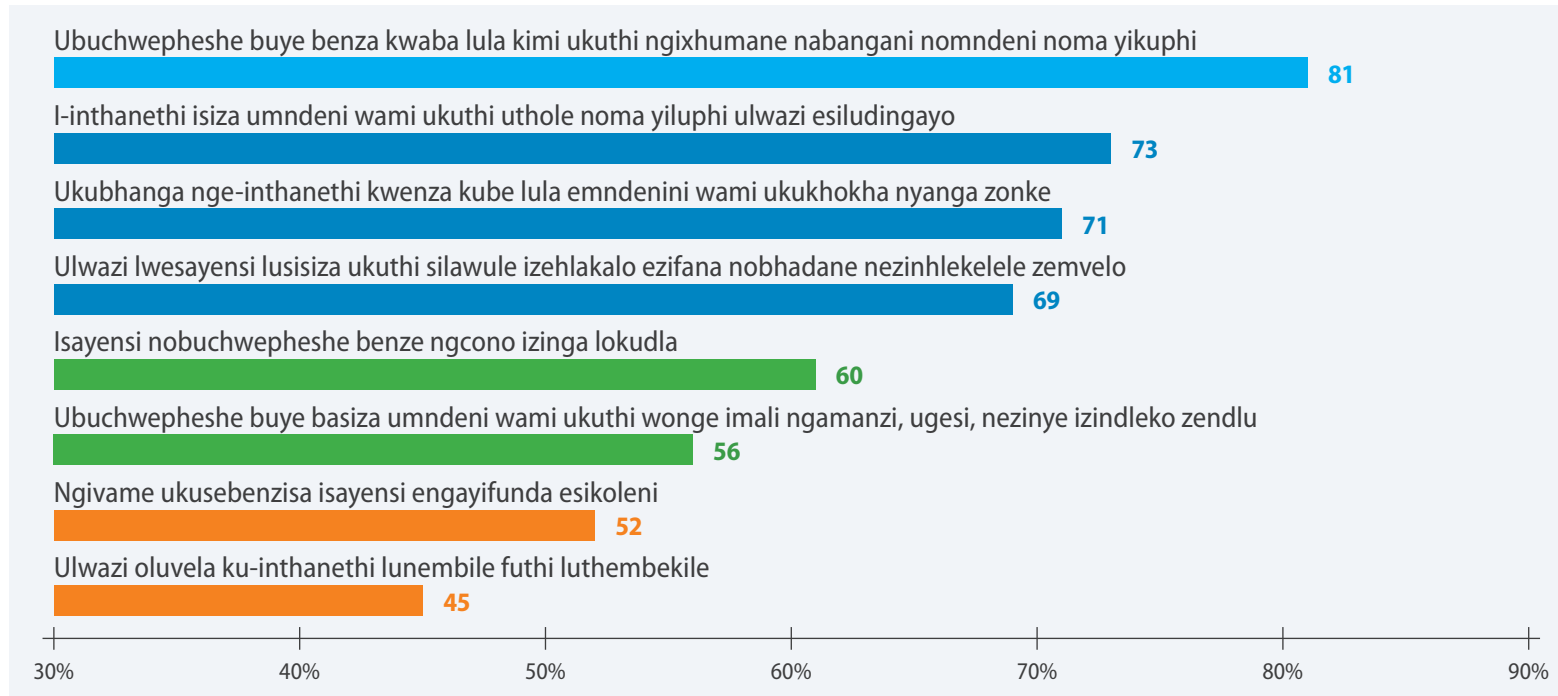
76



## 11.3 Inani lezinto ze-S&T empilweni yansuku zonke

Maningi amathuba okuthi sibheke into ebalulekile uma siyibona ibalulekile ekuphileni kwethu.

### Inani lezinto ze-S&T empilweni yansuku zonke (% isivumelwano)



#### Ubani owazisa kakhulu ukuzizwisa kwe-S&T?

- Abantu abadala abayisishiyagalombili kwabayi-10 babazisa i-S&T ngekhono lokuxhumana nomndeni nabangane, kuyilapho abayisikhombisa kwabangu-10 bezazisa i-S&T ngolwazi olunikeziwe kanye nensizakalo eqondile ekuphileni kwabo kwansuku zonke.
- Ngaphansi kwengxenywe umphakathi uvumile ukuthi ulwazi oluvela ku-inthanethi lunembile futhi luthembekile.
- Labo abazazisa kakhulu i-S&T:
  - Babenemfundo yamabanga aphantsi kanye nokwesekwa kwezemfundo yasekhaya ephakeme,
  - Babebancane, abafundi, nabafundi, kanye
  - Ubonise ulwazi oluphakeme kanye nentshisekelo ku-S&T.

#### IZINGA ELIPHEZULU LESIVUMELWANO

Ukuxhumana kalula phakathi komndeni nabangane kunikwe amandla ubuchwepheshe

81%



#### IZINGA ELIPHANSI KAKHULU LESIVUMELWANO

Ukunemba nokuthembeka kwe-inthanethi

45%



Abayisithupha kubo bonke abantu abadala abayishumi

babeka i-S&T igugu ngekhwalithi ethuthukisiwe yokudla

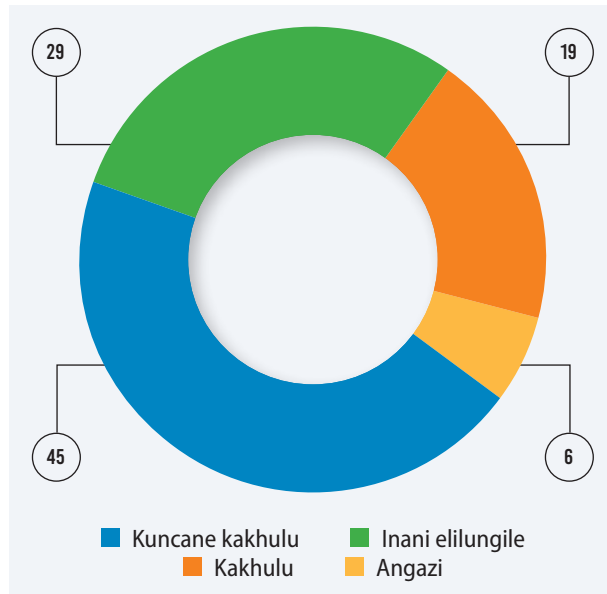
60%



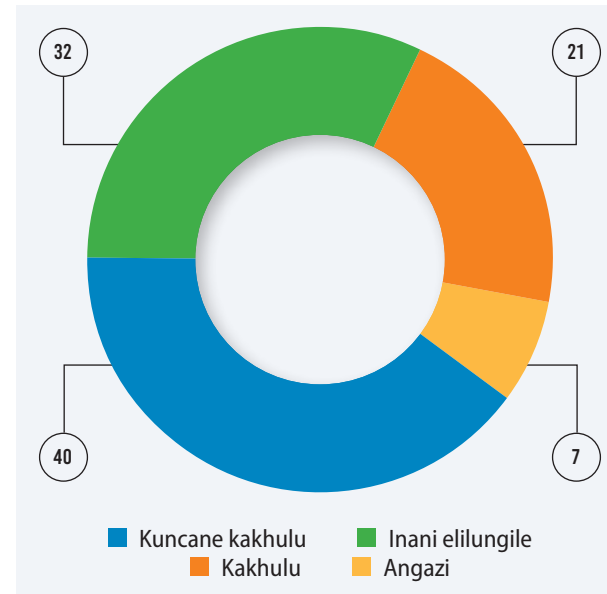
## 11.4 Ukwesekwa komphakathi kwezindleko ze-R&D zesayensi nobuchwepheshe

Imibono yomphakathi mayelana nokutshalwa kwezimali kucwaningo nentuthuko (R&D) ikhombisa kuhulumeni ukuthi isabelomali singabiwa kanjani. Umphakathi ubunombono wokuthi ukusetshenziswa kwemali kwamanje nguhulumeni namabhezini amakhulu ku-R&D phakathi ku-S&T kufanele kugcinwe noma kukhuliswe.

**Ukusetshenziswa kwemali kukahulumeni ku-R&D (%)**



**Ukusetshenziswa kwebhezini ku-R&D (%)**



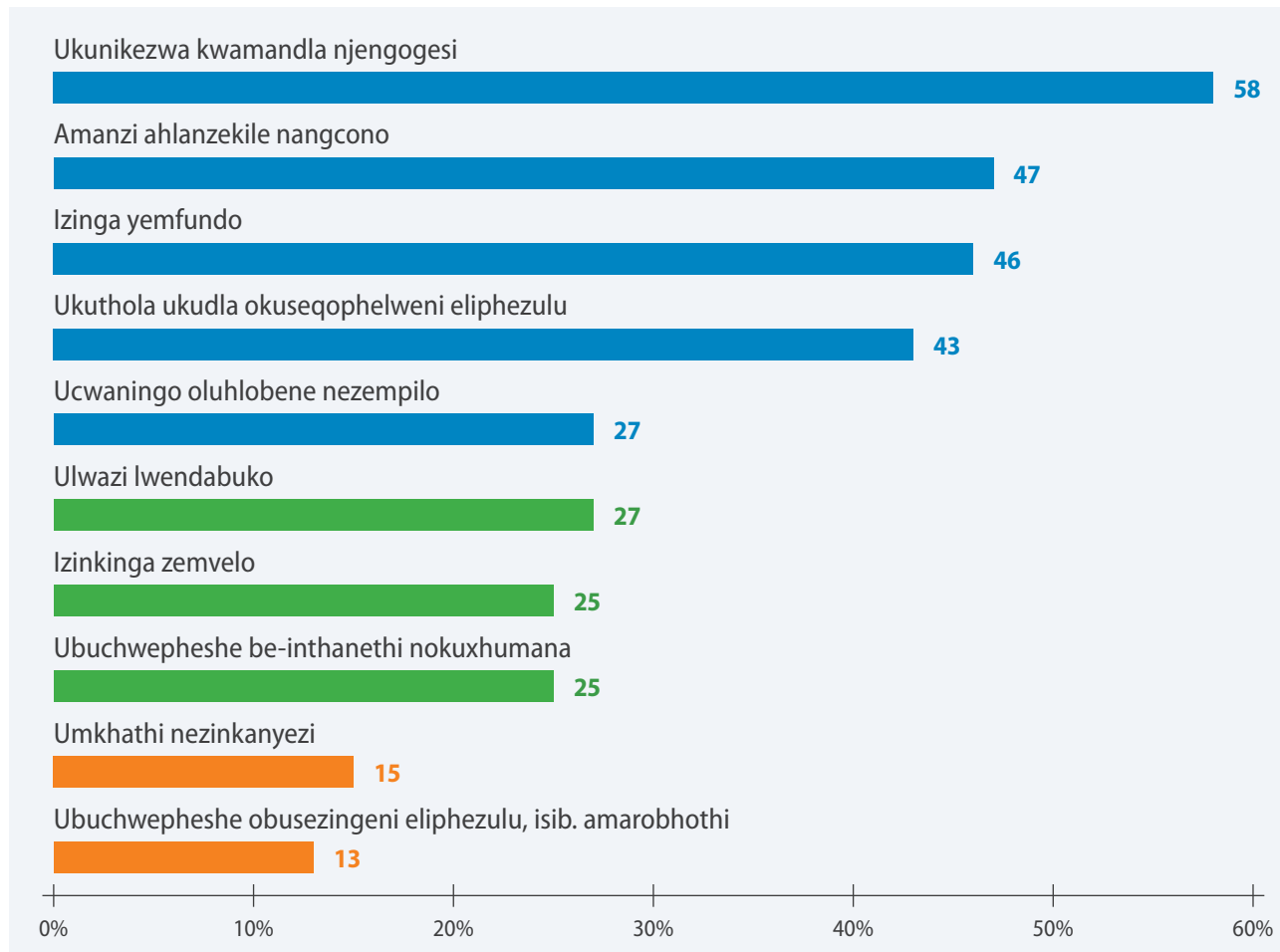
### Izici zalabo abakhathazeke kakhulu ngokuthi ukusetshenziswa kwe-R&D bekuphansi kakhulu

- Ukusekelwa kokusetshenziswa kukahulumeni kwe-R&D ku-S&T kube nokuhluka kwamaphuzu amaningi, ngamaqembu amancane, asuka ku-31 kuya ku-68 kwangu-100. Lokhu kuphakamisa imibono ehlukeni phakathi komphakathi.
- Labo ababekhathazeke kakhulu ngokuthi amazinga amanje oxhaso lwe-R&D ayephansi kakhulu babe:
  - Abaneziqu zemfundo ephakeme,
  - Labo abangabacebe kakhulu be-SES quintiles, kanye
  - Abamhlophe, abeKhaladi, abadala baseNdiya/base-Asia.

## 11.5 Okubalulekile kocwaningo lwe-S&T lwaseNingizimu Afrika

Kusukela kuhlu lwezihloko zezihloko ezibalulekile ze-S&T, umphakathi ukhethe izindawo ezine zocwaningo abanomuzwa wokuthi uhulumeni kufanele aqhubeke nokuzixhasa. Okubalulekile kakhulu okuhlobene nokuhlinzekwa kwamandla kagesi, ukuhlinzekwa kwamanzi, kanye nezinga lemfundo; kuyilapho izinto eziza kuqala eziphansi kwakuyindawo nezinkanyezi, nobuchwepheshe obuthuthukisiwe, obufana namarobhothi.

### Okubalulekile ocwaningweni lwaseNingizimu Afrika ngoxhaso lwezimali locwaningo lwangomuso (%)



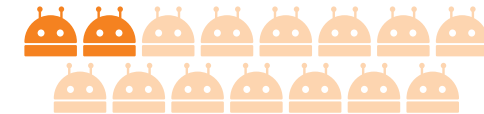
**IBALULEKILE KAKHULU**  
Ukunikezwa kwamandla

**58%**



**OKUPHANSI KAKHULU OKUQALA**  
Ubuchwepheshe obusezingeni eliphezulu,  
obufana namarobhothi

**13%**



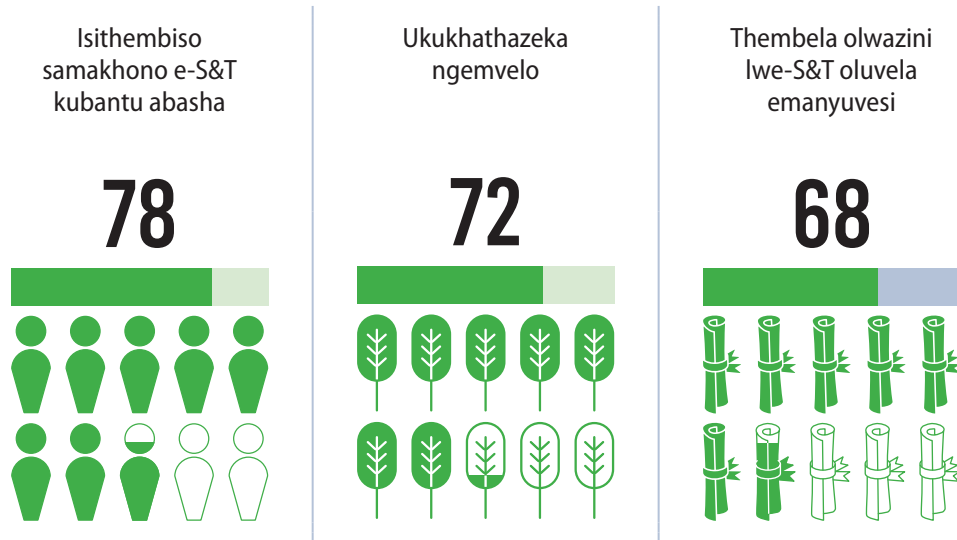
- Izinto ezinhlanu ezihamba phambili ezibalulekile zocwaningo zoxhaso lwesikhathi esizayo (imigoqo eluhlaza okwesibhakabhaka), ezikhethe umphakathi zibhekwa 'njengeziphuthumayo futhi ezibalulekile'. Bamele izinselelo zomphakathi zamanje, imithelela yazo eyingxenyeye yokuphila kwansuku zonke komphakathi.
- Isethi yesibili yezinto ezibalulekile (imigoqo eluhlaza) ingahlukaniswa 'njengebalulekile, kodwa hhayi ephuthumayo'.
- Isethi yesithathu yezinto ezibalulekile cishe izowela esigabeni socwaningo "lwesibhakabhaka esiluhlaza", lapho izicelo zomhlaba wangempela zingabonakali ngokushesha emphakathini.

# 12

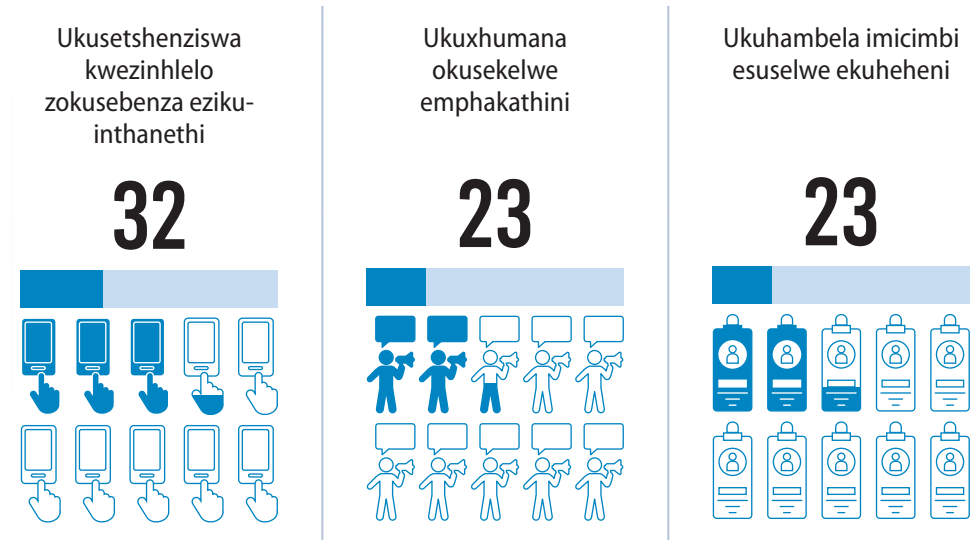
## Izigxivizo zeminwe zobudlelwane bomphakathi waseNingizimu Afrika nesayensi

Ngenkomba ngayinye kwezingu-27 ezikhonjiwe, senze ikhompuyutha (i) isilinganiso senkomba yamaphuzu (kuyi-100), kanye (ii) nokwehluka kwamaphuzu, ngokubala umehluko phakathi kwesilinganiso esiphakeme kakhulu nesiphansi samaphuzu kuwo wonke amaqembu amancane ahlukene.

### AMAPHUZU APHEZULU AMAPhakathi BEKUNGEZIZILINGANISO ZE:



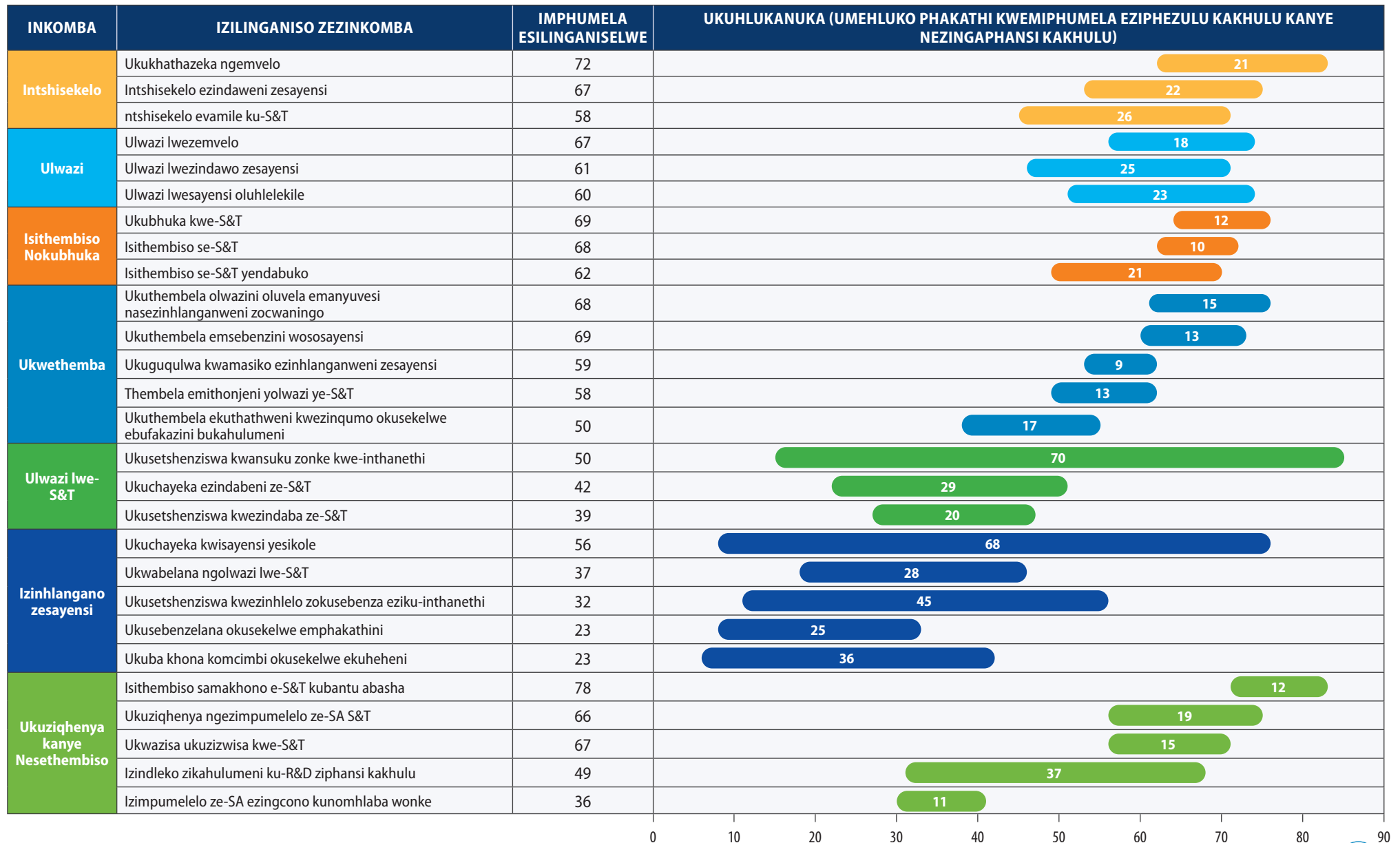
### AMAPHUZU APHASIA AMAPhakathi BEKUNGEZIZILINGANISO ZE:



Ngokuphambene, ukusatshaliswa kwezikolo kwakuphakeme kakhulu ekusetshenzisweni kwansuku zonke kwe-intanethi (70) kanye nokuchayeka ezifundweni ze-STEM zesikole (68); futhi ibiphansi kakhulu ezindleleni zokwethenjwa, isithembiso, kanye nezimo zengqondo zokubhuka. Ukwehluka kwamaphuzu amancane, esikubize njengezinyathelo zokulingana, kusho ukuthi imibono yomphakathi iyafana, kungakhathalekile ukuhlukahluka kwezenhlalo yabantu. Ukwehluka kwamaphuzu okubanzi, okubizwa ngokuthi izilinganiso ezihlukene, kubonisa ukungalingani ngenxa yokuhlukahluka kwezenhlalo nezabantu abadala.

Sibe sesidala “izigxivizo zeminwe” eziyingqayizivele zobudlelwano bomphakathi waseNingizimu Afrika nesayensi ngokuhlela isilinganiso samaphuzu, kanye nokuhlukahluka kwamaphuzu esilinganisweni ngasinye, okufaka ngendlela elula ukwehlukahlukana kolwazi lwethu lwesayensi, isimo sengqondo, kanye izinyathelo zokuzibandakanya.

## 12.1 Ulwazi lwesayensi, izimo zengqondo nezinkomba zokuzibandakanya, izilinganiso, amaphuzu amaphakathi, ukuhluka kwamaphuzu



## 12.2 Ukuhlukanisa izinyathelo zibe izinhlobo ezine

Ukuze siqonde kangcono ukuhluka kobudlelwano bomphakathi nesayensi, sisebenzise amaphuzu amaphakathi nokuhluka kwemiphumela esilinganisweni ngasinye. Sakhe izigaba zamaphuzu esilinganiso esiphezulu nesiphansi (sisebenzisa isilinganiso samaphuzu angu-50 njengendawo yokunqanyulwa), kanye nobubanzi (noma ahlukahlukene), nokuhluka kwamaphuzu amancane (noma alinganayo) (sisebenzisa ukuhluka kwama-20 njengendawo yokunqamula). Sakhe izigaba ezine.

### IMIBUKO YE-EGALITARIAN ENEZINKOLELO EZILINGANE APHEZULU

- Ukwazisa ukuzizwisa kwe-S&T
- Ukuziqhenya ngezimpumelelo ze-SA S&T
- Isithembiso samakhono we-S&T kubantu abasha
- Isithembiso se-S&T
- Ukubhuka kwe-S&T
- Ukuthembela emsebenzini wososayensi
- Ukuthembela olwazini oluvela emanyuvesi nasezinhlanganweni zocwaningo
- Thembela emithonjeni yolwazi ye-S&T
- Ukuguqulwa kwamasiko ezinhlanganweni zesayensi

### IMIBUKO EHLUKILE ENAMAPHUZU ALINGANE EPHEZULU

- Ulwazi lwezindawo zesayensi
- Ulwazi lwesayensi oluhlelekile
- Ukuchayeka kwisayensi yesikole
- Ulwazi lwezemvelo
- Ukukhathazeka ngemvelo
- Intshisekelo evamile ku-S&T
- Intshisekelo ezindaweni zesayensi
- Isithembiso se-S&T yendabuko

### IZILINGANISO EZIHLUKILE ENAMAPHUZU EZILINGENE APHANSI

- Ukusetshenziswa kwansuku zonke kwe-inthanethi
- Ukusetshenziswa kwezinhlelo zokusebenza eziku-inthanethi
- Ukuchayeka ezindabeni ze-S&T
- Ukusetshenziswa kwezindaba ze-S&T
- Ukuba khona komcimbi okusekelwe ekuheheni
- Ukwabelana ngolwazi lwe-S&T
- Izindleko zikahulumeni ku-R&D ziphansi kakhulu

### IZILINGANISO ZE-EGALITARIAN ENAMAPHUZU EZILINGENE APHANSI

- Izimpumelelo ze-SA ezingcono kunomhlaba wonke
- Ukuthembela ekuthathweni kwezinqumo okusekelwe ebufakazini bukahulumeni



# 13 Imiphumela yokuthuthukisa ubudlelwano bomphakathi nesayensi eNingizimu Afrika



1

## UKUBAMBISANA KWESAYENSI KUMELE KWAMUKELE I-PARADIGM YESAYENSI NOMPHEKATHI

Ucwaningo lwamanje, kanye nendlela ye-DSI yohlelo lokuzibandakanya kwezesayensi, itholakala ngaphakathi kweparadigm yesayensi-emphephakathini eqaphela isimo sezihlangothi ezimbili kanye nengxoxo yobudlelwano phakathi kwesayensi nomphakathi, kanye nezindima zabantu ngabanye nezikhungo.



2

## KUFANELE SISHINTSHE OKULANDELAYO MAYELANA INDLELA ESIYIQINISA FUTHI SICHAZA NGAYO UMPHEKATHI WASENINGIZIMU AFRIKA

Imibono yabantu baseNingizimu Afrika iyacatshangelwa, iyacatshangelwa, iyalingana, futhi ibonisa ukuqwashisa ngentuthuko ye-S&T. Cishe isigamu sezinyathelo ezihloliwe, umphakathi ubonise imibono efanayo kungakhathaliseki isizinda sabo senhlalo yabantu. Kwezinye izindlela kube nokuhluka phakathi kwezimpendulo zomphakathi.



3

## AWUKWAZI UKWENZA KABI NGOKUTHUTHUKISA ULWAZI LWESAYENSI

Izinhlelo zokuqwashisa umphakathi ngesayensi kufanele zethulwe ngezinkundla eziningi zendabuko nezokuxhumana, kushumeke isayensi eyingxenye yokuhlangenwe nakho okuphilayo komuntu ngaphakathi kwenkulumo yomphakathi.

**4****KHULISA INZALO KU-S&T FUTHI WAKHE UMPHAKATHI OTHUTHUKISA ISIKO LESAYENSI**

Izinga nokufinyelela kwezinhlelo zamanje zokubandakanya isayensi kufanele kwandiswe, futhi izinhlelo ezintsha ezinokuqukethwe okufanelekile nokuhilelekile kufanele ziqalwe futhi zikhulunywe ngazo ngeziteshi ezihlukahlukene. Lezi zinhlelo kufanele zihlose ukugxilisa isiko lokufuna ukwazi ngokwesayensi kanye nokubuza emphakathini.

**5****ULWAZI LWENZALO, NOKUKHATHALELA I-S&T KUHLUMANE KAKHULU**

Ukugxila entshisekelweni kungase kuvumeleke kakhulu ekungeneleleni. Lokhu kunamandla okudala umjikelezo we-virtual futhi kube nezinzuzo eziqhubekayo kanye nokuchitheka kwezinye izindlela ezihloliwe kulolu cwaningo, njengolwazi nokukhathazeka.

**6****UKUSEBENZA KWEMFUNDO YASEKHAYA KANYE NOKUBANDISWA KUBALULEKILE**

Kuso sonke isikhathi sokuhlaziya, inkomba evelele kwakuwukusekelwa kwezemfundo kwasekhaya ngendlela ekhuthazayo yokufunda, umsebenzi wesikole wasekhaya, nezingxoxo zezindaba, kanye nokwenza kahle nokufunda izifundo zesayensi esikoleni. Ukwesekwa kwemfundo yasekhaya kukhombisa ukubaluleka kwelukuluku lokwazi phakathi kwezizukulwane nokwakhiwa kolwazi.

**7****IMIBUKO NGESITHEMBISO KANYE NEKUZIQHOSHA NOKUTHEMBELA KU-S&T KUYI-EGALITARIAN ESEMQWENI**

Ukuhlanganisa kanye nokwakha okwengeziwe kule mibono kudinga ukuqinisekiswa kwesistimu yamasiko eyazisa, ebungaza, futhi ethuthukisa i-S&T. Kufanele sakhe isimo samasiko esibonisa izinqubo zokuthatha izinqumo ezisekelwe ebufakazini, izimpikiswano, ukuhluzwa, kanye nokuphikiswana kwemibono.

**8****AMAZINGA OLWAZI LWESAYENSI NOKUFINYELELA, UKUCHAZEKA KANYE NOKUSETSHENZISWA KOLWAZI LWE-S&T KUHLUKANISWE NGEZIMALI**

Izici eziyinhloko ezazisa lokhu kwehluka ukuzuzwa kwezemfundo, isimo senhlalo-mnotho, kanye nokuba umfundi noma umfundi. Ukukhushulwa kokuxhumana kwesayensi nokuzibandakanya ngokusebenzisa iziteshi eziningi, kusukela kokunyathelisayo kuye kokusakaza kuya ezinkundleni zokuxhumana, kufanele kukhuthazwe futhi kugunyazwe.

**9****KHULISA UKUFINYELELA OLWAZINI LWE-S&T**

Izingxenywe ezintathu kwezine zomphakathi zine-inthanethi. Umphakathi uyazethemba izindaba ze-S&T ezethulwa ngumabonakude nomsakazo kodwa uyaziqaphela izindaba ze-S&T ezinkundleni zokuxhumana. Ulwazi lwe-S&T kufanele ludluliselwe ngezindlela eziqondakala kalula, ikakhulukazi kumabonakude nasemsakazweni.

**10****UMEHLUKO OMKHULU EKUZIPHATHENI KOKUBANDISWA KWESAYENSI UYAPHELA KODWA UNGATHONYWA KAHLE NGOKUTHUTHUKISA ULWAZI LWESAYENSI KANYE NENZAKALO KANYE NOKUNQOBA IMITHIBELO YESAKHIWO YOKUFINYELELA**

Ngokuvamile, amazinga aphansi okuzibandakanya kwesayensi abonwa kuzo zonke izinhlobo zokubandakanya. Imikhankaso yokuthuthukisa ukusetshenziswa kolwazi, intshisekelo nolwazi, kuhlukaniswe nemizamo yokuthuthukisa ukufinyelela okukhulu kumasayithi e-S&T nemicimbi, kulindeleke ukuthi ibe nomthelela omuhle emazingeni okuzibandakanya kwesayensi.

**11****FUNDISA UMPHAKATHI NGENZULU YE-TRADITIONAL S&T**

Kunesidingo somzamo ohlangene wokuxhumana, ukwazisa, ukufundisa, ukugubha, nokudala ukuqwashisa ngalo mkhakha ocebile we-S&T kubantu abaningi.

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 Intuthuko Inkundla Isayensi Izinketho Ikhemistri  
 Osolwandle Ama-Athomu Imithombo  
 Umlingo Omakhalekhukhwini Ukusha  
 Amafutha Umuthi yemqondo Amandla  
 Uhlelo Ukuthakazelisa Inkimbinkimbi  
 Impumelelo Amakhebuli Isizukulwane lomphathi  
 Ama-Acid Izimayini Ukuhlanza  
 Imali Imibono Izinsimbi Isayensi Izakhiwo

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