SCIENCE AND THE PUBLIC

Water concerns underscored in enlightening first survey on South Africans' relationship with science

South Africa's first comprehensive survey of science knowledge, attitudes, and engagements highlights our concerns and commonalities and offers sage advice on improving our relationship with science. Article by Petro Kotzé.

South Africans have thoughtful, balanced views on science and technology and evidence-based perspectives. The public rated their interest in and knowledge of clean and better water supply and concerns about water shortages highly. These are some of the findings of the South African Public Relationship with Science (SAPRS) survey, many of which she says left principal investigator Dr Vijay Reddy amazed.

The survey was commissioned by the Department of Science, Technology and Innovation (DSTI) and led by the Human Sciences Research Council (HSRC). The 2019 White Paper on Science, Technology and Innovation required the survey, stipulating that South African society needs to understand and value science, engineering and technology for national prosperity and a sustainable environment.

The first comprehensive survey to measure South African science knowledge, attitudes, and engagements, conducted in 2022 (to be repeated every five years), was published in December 2024.

It was no small undertaking. Conceptualising the study, developing the instruments, collecting and analysing the data, and writing the report took more than four years.

The final SAPRS survey instrument was based on seven themes: scientific knowledge and literacy, scientific interest, promise and reservation towards science, trust in science and science institutions, access to S&T information, science engagement behaviours and views of pride and promise towards science. From these 200 items related to the topic (including five SKA items fielded only in the Northern Cape), and 28 demographic and contextual items were constructed.

Then, between November 2022 and January 2023, nearly 6 000 people from 500 areas across the provinces, considered a representative sample of the national population, were interviewed in the official language of their preference.

The data analysis and interpretation were approached with rigour, nuance, and a genuine desire to uncover meaningful insights that could inform policy and public engagement. Reddy, who led the HSRC research team, says it took two years to write the full report. She added that she wanted to go beyond simplistic reporting of percentages and look at the variation of views and attitudes within the population. The project team tried to understand the findings within the broader context of South African society and people's lived experiences, she says. Accordingly, the report first presents the average views of the public for each measure and then analyses how the responses varied across the population.

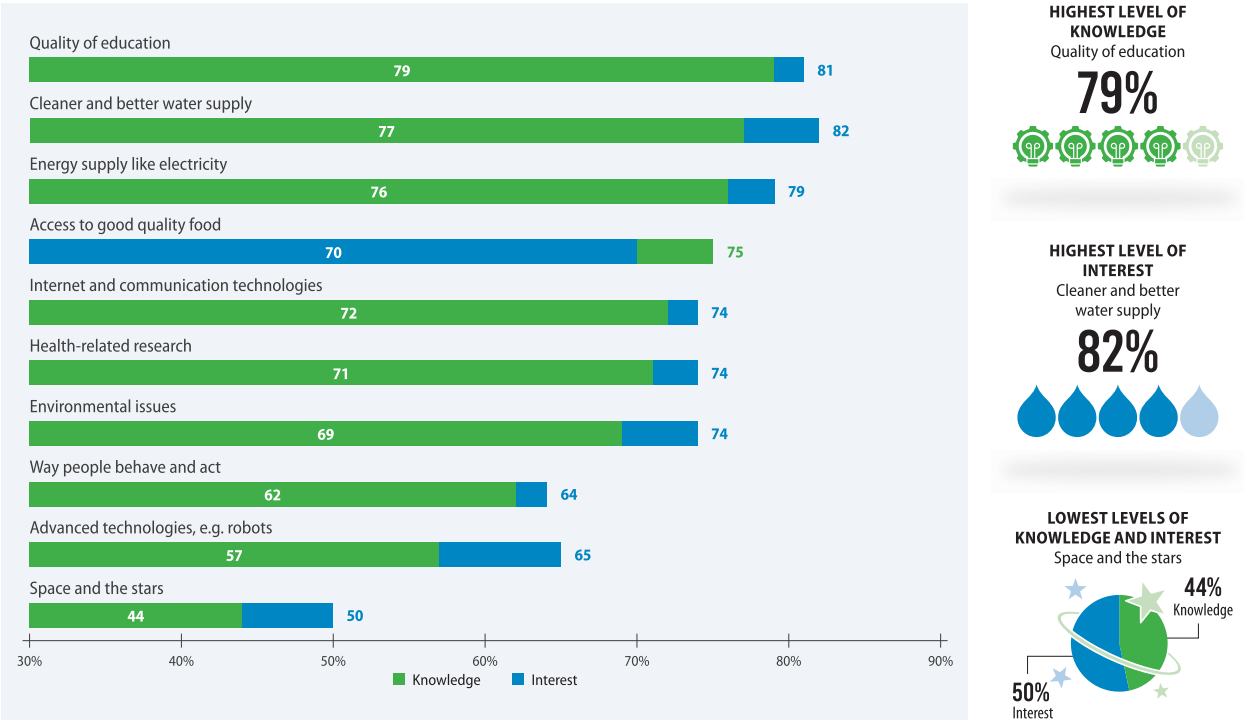
The average views of the public for selected measures

Many of the findings reflect the public's lived experiences, and freshwater-related needs and concerns are featured prominently.

For example, cleaner and better water supply scored highly in the indicator 'Knowledge about and interest in priority science areas.' The topic scored the highest interest among participants (82%) and also scored highly (77%) in participant knowledge. (Refer to the figure below.)

In fact, Reddy says the top four choices for knowledge and interest in research priorities reflect the public's lived experiences and unmet basic needs related to service delivery. They are: quality of education, cleaner and better water supply, energy supply like electricity and access to good quality food. "These are important and urgent needs," she notes.

SAPRS 2022/HSRC



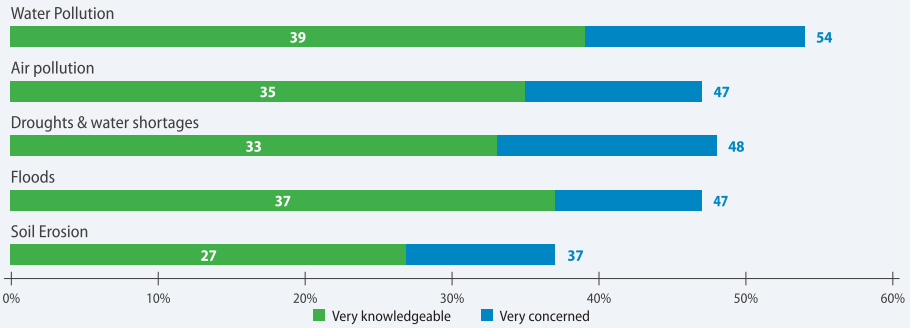
Public awareness and knowledge of and interest in priority science areas: The survey explored the public's knowledge of and interest in contemporary societal challenges that require an S&T response. 'Interest' is defined here as wanting to know more, knowledge as the information already possessed, and awareness as being informed, though not necessarily with understanding.

The public is also highly concerned and knowledgeable about environmental matters. Close to three-quarters reported being, at least "somewhat" knowledgeable about water (79%) and air (77%) pollution, droughts and water shortages (77%), as well as floods (75%). Similarly, the public was at least "somewhat" concerned about water pollution (84%), air pollution (80%), droughts and water shortages (79%), and floods (76%). A slightly fewer percentage of people reported being at least "somewhat" knowledgeable (63%) and concerned (68%) about soil erosion. Close to half of the public were "very" concerned about water pollution (54%), air pollution (47%), droughts and water shortages (48%), as well as floods (47%) – these are catastrophic events that significantly impacted many parts of South Africa in the years leading up to the survey round.

Reddy says this tells us that the South African public is aware of events around them and that even though they may not have formal knowledge, they are concerned.

SAPRS 2022/HSRC

Percentage of adults who were 'very knowledgeable' and 'very concerned' about environmental events



3 in every 4

adults had at least some knowledge and concern about environmental events

HIGH KNOWLEDGE OF AND CONCERN

Environmental events

47% Concern

34% Knowledge

Characteristics of those with higher knowledge and concern about environmental events

- The average scores, by sub-group, were between 56 and 74 (out of 100) for environmental knowledge, and between 62 and 83 for environmental concern.
- Adults who were more knowledgeable and concerned about environmental events:
  - had a post-secondary education, and experienced higher home education support,
  - were from richer SES homes, and
  - lived in urban formal and rural areas.
- White and Indian/Asian adults had higher knowledge about environmental events while White, Black African, and Indian/Asian adults had higher concern about environmental events.

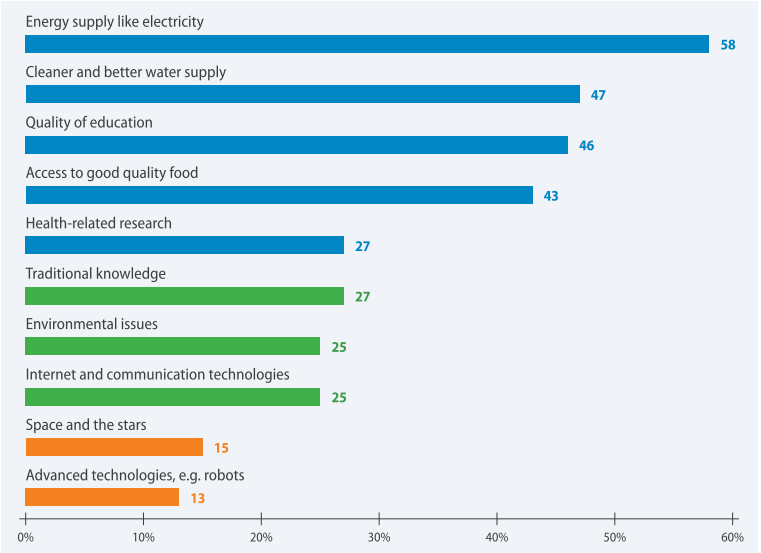
Public knowledge of and concern about environmental events.

When asked to rank funding priorities, cleaner and better water supply was one of the top priorities for the public, along with energy supply and quality of education. According to the final report, even in the Northern Cape region, where the Square Kilometre Array (SKA) telescope is located, people's biggest concerns were mostly around water shortages and droughts.

SAPRS 2022/HSRC

From the list of contemporary S&T priority topic areas, the public selected the four research areas that they felt the government should continue to fund. The highest priorities related to energy supply, water supply, and the quality of education; while the lowest priorities were space and the stars, and advanced technologies, such as robots.

South African research priorities for future research funding (%)



HIGHEST PRIORITY

Energy supply

58%

LOWEST PRIORITY

Advanced technologies, such as robots

13%

- The top five research priorities for future funding (blue bars), chosen by the public are considered 'urgent and important'. They represent contemporary societal challenges, the effects of which form part of the lived daily experiences of the public.
- The second set of priorities (green bars) could be categorised as 'important, but not urgent'.
- The third set of priorities are more likely to fall into the "blue-sky" research category, where real-world applications are not immediately apparent to the public.

Cleaner and better water supply was one of the top priorities for the public.

The report notes that the two areas with the lowest levels of knowledge and interest were far removed from the daily lives of most of the public: the study of space and the stars and advanced technologies like the 4IR. Half of the public (50%) were at least "somewhat" interested in space and the stars, while close to two-thirds (65%) were at least "somewhat" interested in advanced technologies. A slightly lower 44% and 57% reported being "somewhat" or "very", respectively, knowledgeable about these areas.

A glimpse into what unites and divides us

Reddy says she was blown away by the analyses of how the responses varied across the population. They revealed that the public displayed similar views for close to half the measures (promise, pride, and trust), irrespective of their socio-demographic backgrounds. She says she was surprised that the data did not align with the common assumption that those with lower education or socioeconomic status would have more negative attitudes towards science. In fact, South Africans have fairly similar views and attitudes towards science and technology.

Regardless of their education or socioeconomic status, for example, the public trusts information from universities and the work of scientists the most. The findings revealed that South Africans have thoughtful, balanced views on science and technology, not based on superstition but on evidence-based perspectives. This data challenges assumptions and provides a more positive, egalitarian portrait of South African attitudes towards science and technology.

For the other measures, there were variations among the public mainly due to differences in educational attainment, socioeconomic status and access to resources, population group identity and, in some cases, age and geographical location. (Refer to the figure below.)

SAPRS 2022/HSRC

INDICATOR	SUB-INDICATOR MEASURES	AVERAGE SCORE	VARIATION (DIFFERENCE BETWEEN HIGHEST AND LOWEST SCORES)
Interest	Environmental concern	72	21
	Interest in science areas	67	22
	General interest in S&T	58	26
Knowledge	Environmental knowledge	67	18
	Perceived knowledge of science areas	61	25
	Formal science knowledge	60	23
Promise & Reservation	Reservation of S&T	69	12
	Promise of S&T	68	10
	Promise of traditional S&T	62	21
Trust	Trust in S&T information from universities	68	15
	Trust in work of scientists	69	13
	Transformation of cultures in science organisations	59	9
	Trust in S&T information sources	58	13
	Trust in government evidence-based decision-making	50	17
S&T Information	Daily usage of the internet	50	70
	Exposure to S&T news	42	29
	Consumption of S&T news	39	20
Science Engagements	Exposure to school science	56	68
	S&T information sharing	37	28
	Use of online apps	32	45
	Community-based engagement	23	25
	Attraction-based event attendance	23	36
Pride & Promise	Promise of S&T skills for young people	78	12
	Pride in South African S&T achievements	66	19
	Valuing S&T experiences	67	15
	Government spending on R&D is too low	49	37
	South African achievements better than rest of world	36	11

0 10 20 30 40 50 60 70 80 90

The fingerprint of the South African public relationship with science: For each of the 27 identified sub-indicators, an average index score (out of 100) and the score variation were computed. Conversely, the distribution of scores was highest for the daily use of the internet (70) and the exposure to school STEM subjects (68); and was lowest for the trust, promise, and reservation attitudes measures. A narrow score variation, which was termed an egalitarian measure, implies that the public's views are similar, irrespective of the socio-demographic diversity. A wide score variation, termed a diverse measure, indicates the inequality due to the socio-demographic diversity of the adult population. A unique "fingerprint" for the South African public relationship with science was then created by plotting the average score and the score variation for each measure, which captures the diversity in our science knowledge, attitude, and engagement measures.

Recommendations from the report

Experts and managers can garner multiple messages from the report to improve South Africans' relationship with science.

For one, science communication needs to be improved. Institutions can better communicate their water-related research findings and make the information more accessible to the diverse South African population, especially those without easy access to the internet.

The research must be translated into multiple languages to reach a diverse population and be accessible. Different formats like videos, radio, and community engagement must be employed. The information must also be made available through popular media sources like television and radio that reach a broad audience, not just online. As the survey found, the public trusts S&T news presented by television and radio but is cautious about news on social media. Thus, S&T information should be communicated in easily understandable ways on television and radio. This will facilitate greater public exposure to water-related research and information to increase awareness and engagement.

At the same time, the research findings must be relevant to people's lived experiences and immediate needs around water access and quality. According to the report, the key is to tailor communication approaches to the diverse needs and preferences of the South African

population rather than adopting a one-size-fits-all approach.

Getting this right is integral to all South Africans. As Prof Blade Nzimande, Minister of Science, Technology and Innovation, states in the introduction to the final report, "…democracy could only fully succeed if citizens were science-literate and able to form their own opinions on science and related matters."

A snapshot of the survey results
The survey was constructed around seven indicators or impact themes and 27 measures. Selected highlights from indicators are included here.

Knowledge of, and interest in, science and technology and the environment
Studies worldwide show that people's knowledge of, and interest in, science and technology (S&T) reveal important aspects of how the public relates to science and further influences the extent of science engagement. The SAPRS found that:

- 60% of South Africans were aware of science and technology in South Africa, 56% were aware of S&T internationally and 66% were interested in S&T in general.
- Of the priority science areas queried, most South Africans (79%) had knowledge about the quality of education, and the highest percentage (83%) had an interest in cleaner and better water supply
- 'Space and stars' scored the lowest in terms of knowledge (44%) and interest (50%)

Knowledge and concern about environmental events
Given the national and global importance of environmental challenges, the survey included items that focused on the public's knowledge and concern about current natural and environmental events facing South Africa. We report on percentage of those very knowledgeable and very concerned.

- 'Water pollution' is the environmental event that was listed highest in terms of knowledgeable (39%) and concerned (54%)
- The second highest score was for air pollution (35% knowledgeable and 47% concerned)
- Droughts and water shortages were the third highest (33% knowledgeable and 48% concern), followed by floods (37% and 47%, respectively) and soil erosion (27% and 37%, respectively)

Promise and reservation attitudes towards modern and traditional S&T
Interviewees responded to sets of items that asked about their attitudes toward promise (potential benefits) and reservation (concerns, fears, and risks) related to modern and traditional science (TS).

- 78% of respondents thought S&T make the way of life change too fast
- 76% said S&T are making lives healthier, easier and more comfortable

Promise and reservation attitudes towards traditional science
Traditional knowledge is the knowledge and skills passed on from generation to generation within a community.

- 64% said traditional small-scale farming provides healthy food for many South Africans
- 63% said traditional knowledge provides solutions to improve the quality of life
- 55% said they follow the advice of medical experts over traditional healers or home remedies
- 53% said they trust more in modern science than in traditional and cultural practices

Trust in science, scientists and science institutions
For scientific advice to be accepted, the public needs to trust science and scientists and have confidence in institutions that produce such knowledge.

- The category achieved a 69% mean score for trust in scientists
- 76% of respondents said scientists make life better for people
- concerningly only 51% said scientists are honest about their work
- 71% said there is so much information about science that it is hard to know what to believe

Confidence in S&T information from different institutions

- Universities and research organisations were the most trusted (71%).
- Local government was the least trusted (32%)

S&T information: access, exposure, consumption and trust
A good relationship between science and society requires communicating S&T information and ensuring that the public can access and trust this information.
The digital space is now the most popular source for accessing and communicating information. A description of the levels of access to this space, especially in low-income, unequal societies, provides a picture of one of the prerequisites for access to S&T information

- 94% have access to a cell phone and 61% have access to a smart phone
- 31% use the internet for four hours or more on most days.
- Regarding exposure, the most popular source of S&T news was television (60%), followed by internet-based websites (52%) and radio and social media, which both scored 51%.

References:

- Department of Science and Innovation (2024). The South African Public Relationship with Science 2022 Survey Results. Prepared by the Human Sciences Research Council for the Department of Science and Innovation. Pretoria.
- Department of Science and Innovation (2024) Highlights of the South African Public Relationship with Science 2022 Survey Results. Prepared by the Human Sciences Research Council for the Department of Science and Innovation. Pretoria.
- Department of Science and Innovation (2024) Snapshot of the 2022 South African Public Relationship with Science Survey. Prepared by the Human Sciences Research Council for the Department of Science and Innovation. Pretoria.

These reports are available here:
https://hsrcpress.ac.za/saprs-2022/