'Hans Rosling tells the story of "the secret silent miracle of human progress" as only he can. But Factfulness does so much more than that. It also explains why progress is so often secret and silent and teaches readers how to see it clearly.'

Melinda Gates

"Thoroughly researched and clearly written . . . this is a measured, objective, and ultimately optimistic account of where we are and how we got here."

Independent

'A brilliant book everyone should read.'

New Scientist

'A wonderful guide to an improving world, as well as being a well-stocked source of sound advice . . . a pleasure to read . . . and when you've finished you'll be a lot wiser about the world. You'll also feel rather happier . . . I strongly recommend this book.'

Tim Harford

'A fabulous read, succinct and lively . . . a just tribute to this book and the man would be a global day of celebration for facts about our world.'

Jim O'Neill, Nature

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'Factfulness has the power to shift your entire perspective. If you want to understand the world, read it now!'
Rolf Dobelli, author of The Art of Thinking Clearly

'A guide to managing your tendency to misery and becoming a better thinker . . . It's a win-win on the cheering up front.'

Merry Somerset Webb, Financial Times

'Rosling's final work is about the misconceptions most people hold about the world we live in – it's better than we think – and a plea to think critically.'

Robert Muchamore, Metro

FACTFULNESS

TEN REASONS
WE'RE WRONG
ABOUT THE WORLD AND WHY THINGS
ARE BETTER THAN
YOU THINK

Hans Rosling

with Ola Rosling and Anna Rosling Rönnlund



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To the brave barefoot woman,
whose name I don't know but whose rational arguments
saved me from being sliced
by a mob of angry men with machetes

Scientists, Chimpanzees, and You

How did you do? Did you get a lot wrong? Did you feel like you were doing a lot of guessing? If so, let me say two things to comfort you.

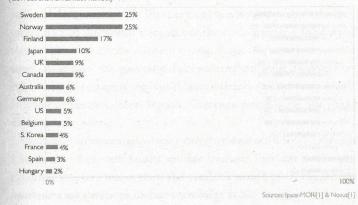
First, when you have finished this book, you will do much better. Not because I will have made you sit down and memorize a string of global statistics. (I am a global health professor, but I'm not crazy.) You'll do better because I will have shared with you a set of simple thinking tools. These will help you get the big picture right, and improve your sense of how the world works, without you having to learn all the details.

And second: if you did badly on this test, you are in very good company.

Over the past decades I have posed hundreds of fact questions like these, about poverty and wealth, population growth, births, deaths, education, health, gender, violence, energy, and the environment—basic global patterns and trends—to thousands of people across the world. The tests are not complicated and there are no trick questions. I am careful only to use facts that are well documented and not disputed. Yet most people do extremely badly.

Question three, for example, is about the trend in extreme poverty. Over the past twenty years, the proportion of the global population living in extreme poverty has halved. This is absolutely revolutionary. I consider it to be the most important change that has happened in the world in my lifetime. It is also a pretty basic fact to know about life on Earth. But people do not know it. On average only 7 percent—less than one in ten!—get it right.

FACT QUESTION 3 RESULTS: percentage who answered correctly. In the last 20 years, the proportion of the world population living in extreme poverty has ... (Correct answer: almost halved.)

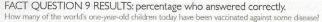


(Yes, I have been talking a lot about the decline of global poverty

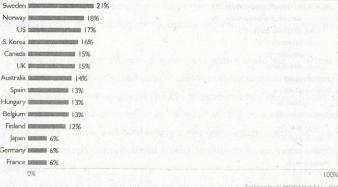
in the Swedish media.)

The Democrats and Republicans in the United States often claim that their opponents don't know the facts. If they measured their own knowledge instead of pointing at each other, maybe everyone could become more humble. When we polled in the United States, only 5 percent picked the right answer. The other 95 percent, regardless of their voting preference, believed either that the extreme poverty rate had not changed over the last 20 years, or, worse, that it had actually doubled—which is literally the opposite of what has actually happened.

Let's take another example: question nine, about vaccination. Almost all children are vaccinated in the world today. This is amazing. It means that almost all human beings alive today have some access to basic modern health care. But most people do not know this. On average just 13 percent of people get the answer right.



(Correct answer: 80%.)



Sources: Ipsos MORIFI] & Novus[1]

Eighty-six percent of people get the final question about climate change right. In all the rich countries where we have tested public knowledge in online polls, most people know that climate experts are predicting warmer weather. In just a few decades, scientific findings have gone from the lab to the public. That is a big public-awareness success story.

Climate change apart though, it is the same story of massive ignorance (by which I do not mean stupidity, or anything intentional, but simply the lack of correct knowledge) for all twelve of the other questions. In 2017 we asked nearly 12,000 people in 14 countries to answer our questions. They scored on average just two correct answers out of the first 12. No one got full marks, and just one person (in Sweden) got 11 out of 12. A stunning 15 percent scored zero.

Perhaps you think that better-educated people would do better? Or people who are more interested in the issues? I certainly thought that once, but I was wrong. I have tested audiences from all around the world and from all walks of life: medical students, teachers, university lecturers, eminent scientists, investment bankers, executives in multinational companies, journalists, activists, and even senior political decision makers. These are highly educated people who take an interest in the world. But most of them—a stunning majority of them-get most of the answers wrong. Some of these groups even score worse than the general public; some of the most appalling results came from a group of Nobel laureates and medical researchers. It is not a question of intelligence. Everyone seems to get the world devastatingly wrong.

Not only devastatingly wrong, but systematically wrong. By which I mean that these test results are not random. They are worse than random: they are worse than the results I would get if the people answering my questions had no knowledge at all.

Imagine I decide to head down to the zoo to test out my questions on the chimpanzees. Imagine I take with me huge armfuls of bananas, each marked either A, B, or C, and throw them into the chimpanzee enclosure. Then I stand outside the enclosure, read out each question in a loud, clear voice, and note down, as each chimpanzee's "answer," the letter on the banana she next chooses to eat.

If I did this (and I wouldn't ever actually do this, but just imagine), the chimps, by picking randomly, would do consistently better than the well-educated but deluded human beings who take my tests. Through pure luck, the troop of chimps would score 33 percent on each threeanswer question, or four out of the first 12 on the whole test. Remember that the humans I have tested get on average just two out of 12 on the same test.

What's more, the chimps' errors would be equally shared between the two wrong answers, whereas the human errors all tend to be in one direction. Every group of people I ask thinks the world is more frightening, more violent, and more hopeless—in short, more dramatic than it really is.

Why Don't We Beat the Chimpanzees?

How can so many people be so wrong about so much? How is it even possible that the majority of people score worse than chimpanzees? Worse than random!

When I got my first little glimpse of this massive ignorance, back in the mid-1990s, I was pleased. I had just started teaching a course in global health at Karolinska Institutet in Sweden and I was a little nervous. These students were incredibly smart; maybe they would already know everything I had to teach them? What a relief when I discovered that my students knew less about the world than chimpanzees.

But the more I tested people, the more ignorance I found, not only among my students but everywhere. I found it frustrating and worrying that people were so wrong about the world. When you use the GPS in your car, it is important that it is using the right information. You wouldn't trust it if it seemed to be navigating you through a different city than the one you were in, because you would know that you would end up in the wrong place. So how could policy makers and politicians solve global problems if they were operating on the wrong facts? How could business people make sensible decisions for their organizations if their worldview were upside down? And how could each person going about their life know which issues they should be stressed and worried about?

I decided to start doing more than just testing knowledge and exposing ignorance. I decided to try to understand why. Why was this ignorance about the world so widespread and so persistent? We are all wrong sometimes—even me, I will readily admit that—but how could so many people be wrong about so much? Why were so many people scoring worse than the chimps?

Working late one night at the university I had a eureka moment. I realized the problem couldn't simply be that people lacked

the knowledge, because that would give randomly incorrect answers—chimpanzee answers—rather than worse-than-random, worse-than-chimpanzee, systematically wrong answers. Only actively wrong "knowledge" can make us score so badly.

Aha! I had it! What I was dealing with here—or so I thought, for many years—was an upgrade problem: my global health students, and all the other people who took my tests over the years, did have knowledge, but it was outdated, often several decades old. People had a worldview dated to the time when their teachers had left school.

So, to eradicate ignorance, or so I concluded, I needed to upgrade people's knowledge. And to do that, I needed to develop better teaching materials setting out the data more clearly. After I told Anna and Ola about my struggles over a family dinner, both of them got involved and started to develop animated graphs. I traveled the world with these elegant teaching tools. They took me to TED talks in Monterey, Berlin, and Cannes, to the boardrooms of multinational corporations like Coca-Cola and IKEA, to global banks and hedge funds, to the US State Department. I was excited to use our animated charts to show everyone how the world had changed. I had great fun telling everyone that they were emperors with no clothes, that they knew nothing about the world. We wanted to install the worldview upgrade in everyone.

But gradually, gradually, we came to realize that there was something more going on. The ignorance we kept on finding was not just an upgrade problem. It couldn't be fixed simply by providing clearer data animations or better teaching tools. Because even people who loved my lectures, I sadly realized, weren't really hearing them. They might indeed be inspired, momentarily, but after the lecture, they were still stuck in their old negative worldview. The new ideas just wouldn't take. Even straight after my presentations, I would hear people expressing beliefs about poverty or population growth that I had just proven wrong with the facts. I almost gave up.

Why was the dramatic worldview so persistent? Could the media be to blame? Of course I thought about that. But it wasn't the answer. Sure, the media plays a role, and I discuss that later, but we must not make them into a pantomime villain. We cannot just shout "boo, hiss" at the media.

I had a defining moment in January 2015, at the World Economic Forum in the small and fashionable Swiss town of Davos. One thousand of the world's most powerful and influential political and business leaders, entrepreneurs, researchers, activists, journalists, and even many high-ranking UN officials had queued for seats at the forum's main session on socioeconomic and sustainable development, featuring me, and Bill and Melinda Gates. Scanning the room as I stepped onto the stage, I noticed several heads of state and a former secretary-general of the UN. I saw heads of UN organizations, leaders of major multinational companies, and journalists I recognized from TV.

I was about to ask the audience three fact questions—about poverty, population growth, and vaccination rates—and I was quite nervous. If my audience *did* know the answers to my questions, then none of the rest of my slides, revealing with a flourish how wrong they were, and what they should have answered, would work.

I shouldn't have worried. This top international audience who would spend the next few days explaining the world to each other did indeed know more than the general public about poverty. A stunning 61 percent of them got it right. But on the other two questions, about future population growth and the availability of basic primary health care, they still did worse than the chimps. Here were people who had access to all the latest data and to advisers who could continuously update them. Their ignorance could not possibly be down to an outdated worldview. Yet even they were getting the basic facts about the world wrong.

After Davos, things crystallized.

Our Dramatic Instincts and the Overdramatic Worldview

So here is this book. It shares with you the conclusions I finally reached—based on years of trying to teach a fact-based worldview, and listening to how people misinterpret the facts even when they are right there in front of them—about why so many people, from members of the public to very smart, highly educated experts, score worse than chimpanzees on fact questions about the world. (And I will also tell you what you can do about it.) In short:

Think about the world. War, violence, natural disasters, man-made disasters, corruption. Things are bad, and it feels like they are getting worse, right? The rich are getting richer and the poor are getting poorer; and the number of poor just keeps increasing; and we will soon run out of resources unless we do something drastic. At least that's the picture that most Westerners see in the media and carry around in their heads. I call it the overdramatic worldview. It's stressful and misleading.

In fact, the vast majority of the world's population lives somewhere in the middle of the income scale. Perhaps they are not what we think of as middle class, but they are not living in extreme poverty. Their girls go to school, their children get vaccinated, they live in two-child families, and they want to go abroad on holiday, not as refugees. Step-bystep, year-by-year, the world is improving. Not on every single measure every single year, but as a rule. Though the world faces huge challenges, we have made tremendous progress. This is the fact-based worldview.

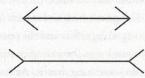
It is the overdramatic worldview that draws people to the most dramatic and negative answers to my fact questions. People constantly and intuitively refer to their worldview when thinking, guessing, or learning about the world. So if your worldview is wrong, then you will systematically make wrong guesses. But this overdramatic worldview is not caused simply by out-of-date knowledge, as I once thought. Even people with access to the latest information get the world wrong. And I am

convinced it is not the fault of an evil-minded media, propaganda, fake news, or wrong facts.

My experience, over decades of lecturing, and testing, and listening to the ways people misinterpret the facts even when they are right in front of them, finally brought me to see that the overdramatic worldview is so difficult to shift because it comes from the very way our brains work.

Optical Illusions and Global Illusions

Look at the two horizontal lines below. Which line is longest?



Source: Müller-Lyer illusio

You might have seen this before. The line on the bottom looks longer than the line on the top. You know it isn't, but even if you already know, even if you measure the lines yourself and confirm that they are the same, you keep seeing them as different lengths.

My glasses have a custom lens to correct for my personal sight problem. But when I look at this optical illusion, I still misinterpret what I see, just like everyone else. This is because illusions don't happen in our eyes, they happen in our brains. They are systematic misinterpretations, unrelated to individual sight problems. Knowing that most people are deluded means you don't need to be embarrassed. Instead you can be curious: how does the illusion work?

Similarly, you can look at the results from the public polls and skip being embarrassed. Instead be curious. How does this "global illusion" work? Why do so many people's brains systematically misinterpret the state of the world?

The human brain is a product of millions of years of evolution, and we are hard-wired with instincts that helped our ancestors to survive in small groups of hunters and gatherers. Our brains often jump to swift conclusions without much thinking, which used to help us to avoid immediate dangers. We are interested in gossip and dramatic stories, which used to be the only source of news and useful information. We crave sugar and fat, which used to be life-saving sources of energy when food was scarce. We have many instincts that used to be useful thousands of years ago, but we live in a very different world now.

Our cravings for sugar and fat make obesity one of the largest health problems in the world today. We have to teach our children, and ourselves, to stay away from sweets and chips. In the same way, our quick-thinking brains and cravings for drama—our dramatic instincts—are causing misconceptions and an overdramatic worldview.

Don't misunderstand me. We still need these dramatic instincts to give meaning to our world and get us through the day. If we sifted every input and analyzed every decision rationally, a normal life would be impossible. We should not cut out all sugar and fat, and we should not ask a surgeon to remove the parts of our brain that deal with emotions. But we need to learn to control our drama intake. Uncontrolled, our appetite for the dramatic goes too far, prevents us from seeing the world as it is, and leads us terribly astray.

Factfulness and the Fact-Based Worldview

This book is my very last battle in my lifelong mission to fight devastating global ignorance. It is my last attempt to make an impact on the world: to change people's ways of thinking, calm their irrational fears, and redirect their energies into constructive activities. In my previous battles I armed myself with huge data sets, eye-opening software, an

energetic lecturing style, and a Swedish bayonet. It wasn't enough. But I hope that this book will be.

This is data as you have never known it: it is data as therapy. It is understanding as a source of mental peace. Because the world is not as dramatic as it seems.

Factfulness, like a healthy diet and regular exercise, can and should become part of your daily life. Start to practice it, and you will be able to replace your overdramatic worldview with a worldview based on facts. You will be able to get the world right without learning it by heart. You will make better decisions, stay alert to real dangers and possibilities, and avoid being constantly stressed about the wrong things.

I will teach you how to recognize overdramatic stories and give you some thinking tools to control your dramatic instincts. Then you will be able to shift your misconceptions, develop a fact-based worldview, and beat the chimps every time.

Back to the Circus

I occasionally swallow swords at the end of my lectures to demonstrate in a practical way that the seemingly impossible is possible. Before my circus act, I will have been testing my audience's factual knowledge about the world. I will have shown them that the world is completely different from what they thought. I will have proven to them that many of the changes they think will never happen have already happened. I will have been struggling to awaken their curiosity about what is possible, which is absolutely different from what they believe, and from what they see in the news every day.

I swallow the sword because I want the audience to realize how wrong their intuitions can be. I want them to realize that what I have shown them—both the sword swallowing and the material about the

world that came before it—however much it conflicts with their preconceived ideas, however impossible it seems, is true.

I want people, when they realize they have been wrong about the world, to feel not embarrassment, but that childlike sense of wonder, inspiration, and curiosity that I remember from the circus, and that I still get every time I discover I have been wrong: "Wow, how is that even possible?"

This is a book about the world and how it really is. It is also a book about you, and why you (and almost everyone I have ever met) do not see the world as it really is. It is about what you can do about it, and how this will make you feel more positive, less stressed, and more hopeful as you walk out of the circus tent and back into the world.

So, if you are more interested in being right than in continuing to live in your bubble; if you are willing to change your worldview; if you are ready for critical thinking to replace instinctive reaction; and if you are feeling humble, curious, and ready to be amazed—then please read on.

it had been an independent country at that time, although in reality it was still under British rule as part of British India. See gapm.io/geob.

World Health Chart 2017. On p. 56, I refer to a colorful chart: the World Health Chart 2017. Each bubble is a country. The size of the bubble represents the country's population, and the color of the bubble its geographical region. On the x-axis is GDP per capita (PPP in constant 2011 international \$) and on the y-axis life expectancy. The population data comes from UN-Pop[1], the GDP data from World Bank[1], and the life expectancy data from IHME[1], all extended to 2017 by Gapminder as described above. This chart, together with more information about the sources, is freely available at www.gapminder.org/whc.

Introduction

X-ray. The X-ray was taken by Staffan Bremmer at Sophiahemmet in Stockholm. The sword swallower is a friend of Hans's, called Maryanne Magdalen. Her website is here: gapm.io/xsword.

Fact questions. The 13 fact questions are freely available in multiple languages at www.gapminder.org/test/2017.

Online polls. Gapminder worked with Ipsos MORI and Novus to test 12,000 people in 14 countries. Their polls were conducted with online panels weighted to be representative of the adult populations—Ipsos MORI[1] and Novus[1]. The average number of correct answers for the 12 questions (i.e., excluding question 13 on climate change) was 2.2, which we rounded to 2. See more at gapm.io/rtest17.

Poll results. The results of the online polls by question and country are set out in the appendix. For the results of the polls we have conducted in our lectures, see gapm.io/rrs.

World Economic Forum lecture. For a video recording of the lecture (the audience receives its results five minutes and 18 seconds in), see WEF.

Fact Question 1: Correct answer is C. Sixty percent of the girls in low-income countries finish primary school. According to World Bank[3], the number is 63.2 percent, but we rounded it to 60 percent to avoid overstating progress. See gapm.io/q1.

Fact Question 2: Correct answer is B. The majority of people live in middle-income countries. The World Bank[2] divides countries into income groups based on gross national income per capita in current US \$\| \]

According to the World Bank[4], the low-income countries represent 9 percent of the world population, the middle-income countries, 76 percent of the world population, and the high-income countries, 16 percent of the world population. See gapm.io/q2.

Fact Question 3: Correct answer is C. The share of people living on less than \$1.9/day fell from 34 percent in 1993 to 10.7 percent in 2013, according to World Bank[5]. Despite the impression of precision given by the precise threshold of \$1.9/day and the use of decimals, the uncertainties in these numbers are very large. Extreme poverty is very difficult to measure: the poorest people are mostly subsistence farmers or destitute slum dwellers, with unpredictable and constantly changing living conditions and few documented monetary transactions. But even if the exact levels are uncertain, the trend direction is not uncertain, because the sources of error are probably constant over time. We can trust that the level has fallen to at least half, if not one-third. See gapm.io/q3.

Fact Question 4: Correct answer is C. The average global life expectancy for those born in 2016 was 72.48 years, according to IHME[1]. The UN-Pop[3] estimate is slightly lower, at 71.9 years. We rounded to 70 to avoid overstating progress. See gapm.io/q4.

Fact Question 5: Correct answer is C. For the past ten years, UN-Pop[2] has published forecasts predicting that the number of children in the year 2100 will not be higher than it is today. See gapm.io/q5.

Fact Question 6: Correct answer is B. In their forecasts, the experts at the UN Population Division calculate that 1 percent of the population increase will come from 0.37 billion more children (age 0–14), 69 percent from 2.5 billion more adults (age 15 to 74), and 30 percent from 1.1 billion more very old people (age 75 and older). Data is from UN-Pop[3]. See gapm.io/q6.

Fact Question 7: Correct answer is C. Annual deaths from natural disasters have decreased by 75 percent over the past 100 years, according to the International Disaster Database; see EM-DAT. Since disasters vary from year to year, we compare ten-year averages. In the last ten years (2007–2016), on average 80,386 people were killed by natural disasters per year. This is 25 percent of the number 100 years earlier (1907–1916), when it was 325,742 deaths per year. See gapm.io/q7.

Vact Question 8: Correct answer is A. The world population in 2017 is 7.55 billion, according to UN-Pop[1]. That would usually be rounded to eight

billion, but we show seven billion because we are rounding the population region by region. The populations of the four Gapminder[1] regions were estimated based on national data from UN-Pop[1]: the Americas, 1.0 billion; Europe, 0.84 billion; Africa, 1.3 billion; Asia, 4.4 billion. See gapm. io/q8.

Fact Question 9: Correct answer is C. Eighty-eight percent of one-year-old children in the world today are vaccinated against some disease, according to WHO[1]. We rounded it down to 80 percent to avoid overstating progress. See gapm.io/q9.

Fact Question 10: Correct answer is A. Worldwide, women aged 25 to 34 have an average of 9.09 years of schooling, and men have 10.21, according to IHME[2] estimates from 188 countries. Women aged 25 to 29 have an average of 8.79 years of schooling, and men 9.32 years, according to Barro and Lee (2013) estimates from 146 countries in 2010. See gapm.io /q10.

Fact Question 11: Correct answer is C. None of the three species are classified as more critically endangered today than they were in 1996, according to the IUCN Red List of Threatened Species. The tiger (Panthera tigris) was classified as Endangered (EN) in 1996, and it still is; see IUCN Red List[1]. But after a century of decline, tiger numbers in the wild are on the rise, according to WWF and Platt (2016). According to IUCN Red List[2], the giant panda (Ailuropoda melanoleuca) was classified as Endangered (EN) in 1996, but in 2015, new assessments of increasing wild populations resulted in a change of classification to the less critical status Vulnerable (VU). The black rhino (Diceros bicornis) was classified as Critically Endangered (CR) and still is; see IUCN Red List[3]. But the International Rhino Foundation says many populations in the wild are slowly increasing. See gapm.io/q11.

Fact Question 12: Correct answer is C. A majority of the world population, 85.3 percent, had some access to the electricity grid in their countries, according to GTF. We rounded this down to 80 percent to avoid overstating progress. The term "access" is defined differently in all their underlying sources. In some extreme cases, households may experience an average of 60 power outages per week and still be listed as "having access to electricity." The question, accordingly, talks about "some" access. See gapm.io/q12.

Fact Question 13: Correct answer is A. "Climate experts" refers to the 274 authors of the IPCC[1] Fifth Assessment Report (AR5), published in

2014 by the Intergovernmental Panel on Climate Change (IPCC), who write, "Surface temperature is projected to rise over the 21st century under all assessed emission scenarios"; see IPCC[2]. See gapm.io/q13.

Illusions. The idea of explaining cognitive biases using the Müller-Lyer illusion comes from *Thinking, Fast and Slow,* by Daniel Kahneman (2011).

The ten instincts and cognitive psychology. Our thinking on the ten instincts was influenced by the work of a number of brilliant cognitive scientists. Some of the books that completely changed our thinking about the mind and about how we should teach facts about the world are: Dan Ariely, Predictably Irrational (2008), The Upside of Irrationality (2010), and The Honest Truth About Dishonesty (2012); Steven Pinker, How the Mind Works (1997), The Stuff of Thought (2007), The Blank Slate (2002), and The Better Angels of Our Nature (2011); Carol Tavris and Elliot Aronson, Mistakes Were Made (But Not by Me) (2007); Daniel Kahneman, Thinking, Fast and Slow (2011); Walter Mischel, The Marshmallow Test (2014); Philip E. Tetlock and Dan Gardner, Superforecasting (2015); Jonathan Gottschall, The Storytelling Animal (2012); Jonathan Haidt, The Happiness Hypothesis (2006) and The Righteous Mind (2012); and Thomas Gilovich, How We Know What Isn't So (1991).

Chapter One: The Gap Instinct

Child mortality. The child mortality data used in the 1995 lecture came from UNICEF[1]. In this book we have updated the examples and use the new mortality data from UN-IGME.

Bubble charts. The bubble charts on family size and child survival rates in 1965 and 2017 use data from UN-Pop[1,3,4] and UN-IGME. An interactive version of the chart is freely available here: gapm.io/voutdwv.

Low-income countries. Gapminder has asked the public in the United States and Sweden how they imagine life in "low-income countries" or "developing countries." They systematically guessed numbers that would have been correct 30 or 40 years ago. See gapm.io/rdev.

The primary school completion rate for girls is below 35 percent in just three countries. But for all three, the uncertainty is high and the numbers are outdated: Afghanistan (1993), 15 percent; South Sudan (2011), 18 percent; Chad (2011), 30 percent. Three other countries (Somalia, Syria, and Libya) have no official number. The girls in these six countries