

In over 700 diseases women are diagnosed

4.5 years

later than men

(Reuters 2019)

Women are diagnosed with cancer

2.5 years

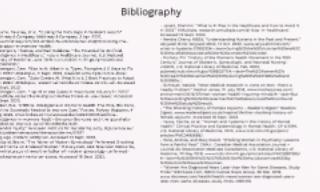
later than men

(Reuters 2019)

Good AI starts with, and relies on, good data.

(Epker, 2023)

Conclusion



Development of healthcare AI models

Ethical Considerations of AI in Women's Healthcare; Reducing Bias
By Hope Crocker

What AI is used in healthcare?



What does this mean about our data?

At any time, our current data:

- is 2.5 years behind in cancer diagnoses
- 4.5 years behind in over 700 other diseases
- 50% of heart attack diagnoses in women are misdiagnosed.
- 66% of our studies do not accurately represent both genders, and men's symptoms are the default.

It is “fundamentally wrong” to treat women based on research that was performed on men, says Marek Glezerman, professor emeritus of obstetrics and gynecology at the Sackler School of Medicine in Tel Aviv

(Schreyer, 2016)

Without incorporating these differences in an artificial intelligence algorithm, the output may be incorrect. This can lead to dangerous consequences for patients.

(Shehmir, 2022)

But...

What ethical considerations must we acknowledge and face during development?

Reducing Bias

Healthcare AI
Diverse AI development teams
Regulatory supervision from government and academic
Only use high-quality data
Use a diverse metric approach
Address where bias may be present
Strategize ways to limit bias, whether by
deciding what data to use or how to use it
Decide when automated decision making should
replace human-made and vice versa.
Use a multi-disciplinary approach

(Burns et al., 2022)

Women's Healthcare

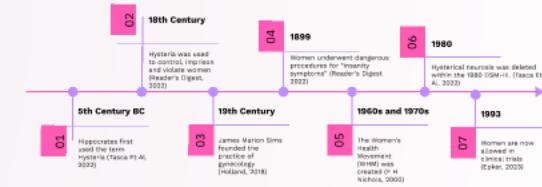
Define women's health
Data generation: utilizing claims data
Try to utilize insurance claims data
Data collection: using and reporting data that is disaggregated

(Burns et al., 2022)

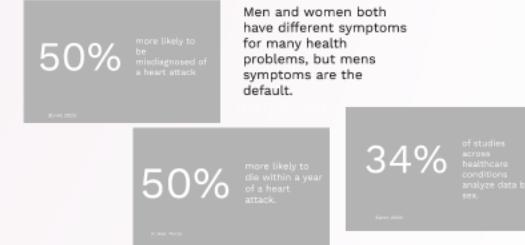
Agenda

1. What is AI used for in healthcare?
2. History of women's healthcare data
3. Present state of women's healthcare
4. How to reduce gender bias in healthcare AI

A timeline of women's health history; What our data shows



Present State of Women's Healthcare



**Artificial intelligence is
the future of
healthcare***

*(Davenport et al. 2019)

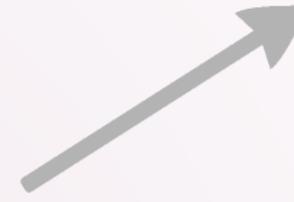
But...

**What ethical considerations must we
acknowledge and face during
development?**

Ethical Considerations of AI in Women's Healthcare; Reducing Bias

By Hope Crocker

Development of
healthcare AI models

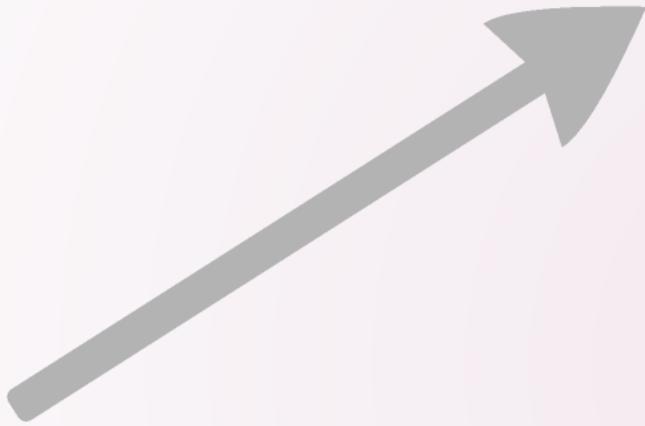


healthcare
equity

Fairness
justice
equal distribution of benefits

European Institute for Gender Equality

healthcare equity



Fairness
justice
equal distribution of benefits

European Institute for Gender Equality

nt of
models

Ethical Considerations of AI in Women's Healthcare; Reducing Bias

By Hope Crocker

Agenda

- 1.** What is AI used for in healthcare?
- 2.** History of women's healthcare data
- 3.** Present state of women's healthcare
- 4.** How to reduce gender bias in healthcareAI

What AI is used in healthcare?



Patient Care

Patient data analysis

(Dilmegani, 2023)

Assisted or automated diagnosis

Pregnancy management

Personalize prescription medication

Prioritizing cases and triage

Medical imaging
insights

Medical Imaging

Error prevention
in diagnostics

Early diagnosis

Device
comparative
effectiveness

New drug
discovery

Research and Development

Drug
Comparison of
effectiveness

Gene analytics

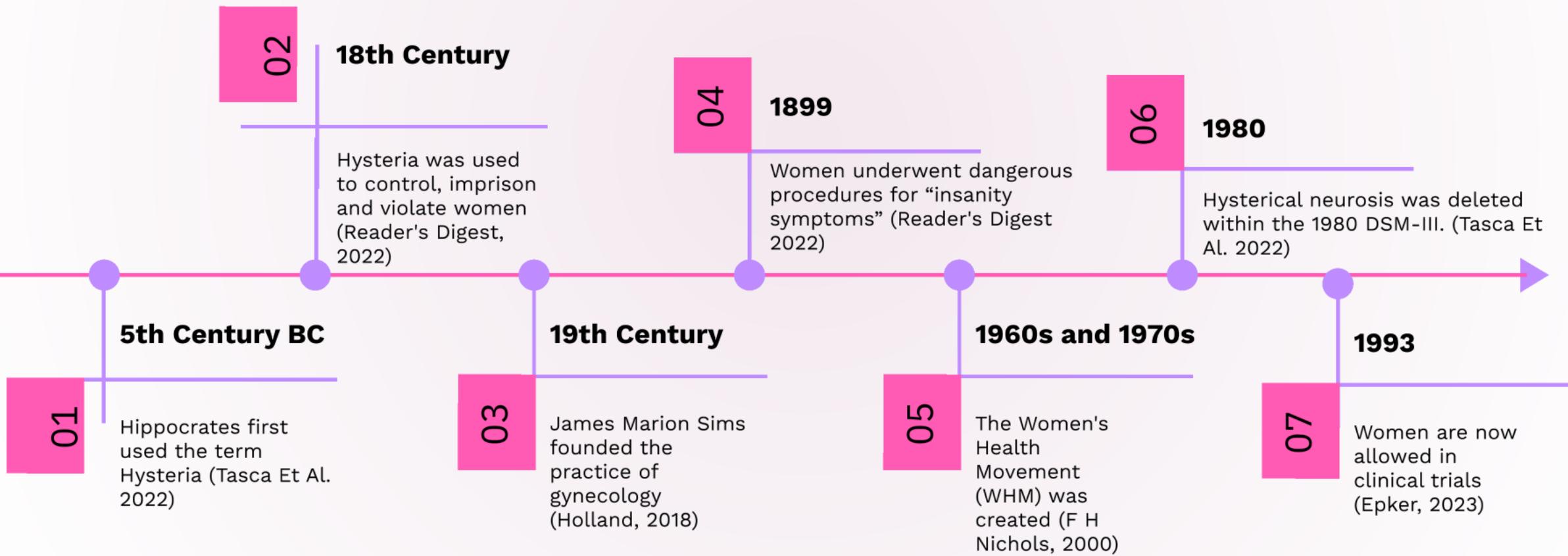
Management

Brand
management
and marketing

Market research

Pricing analysis

A timeline of women's health history; What our data shows



5th Century BC

1

Hippocrates first
used the term
Hysteria (Tasca Et Al.
2022)

3

5th Century BC

02

18th Century

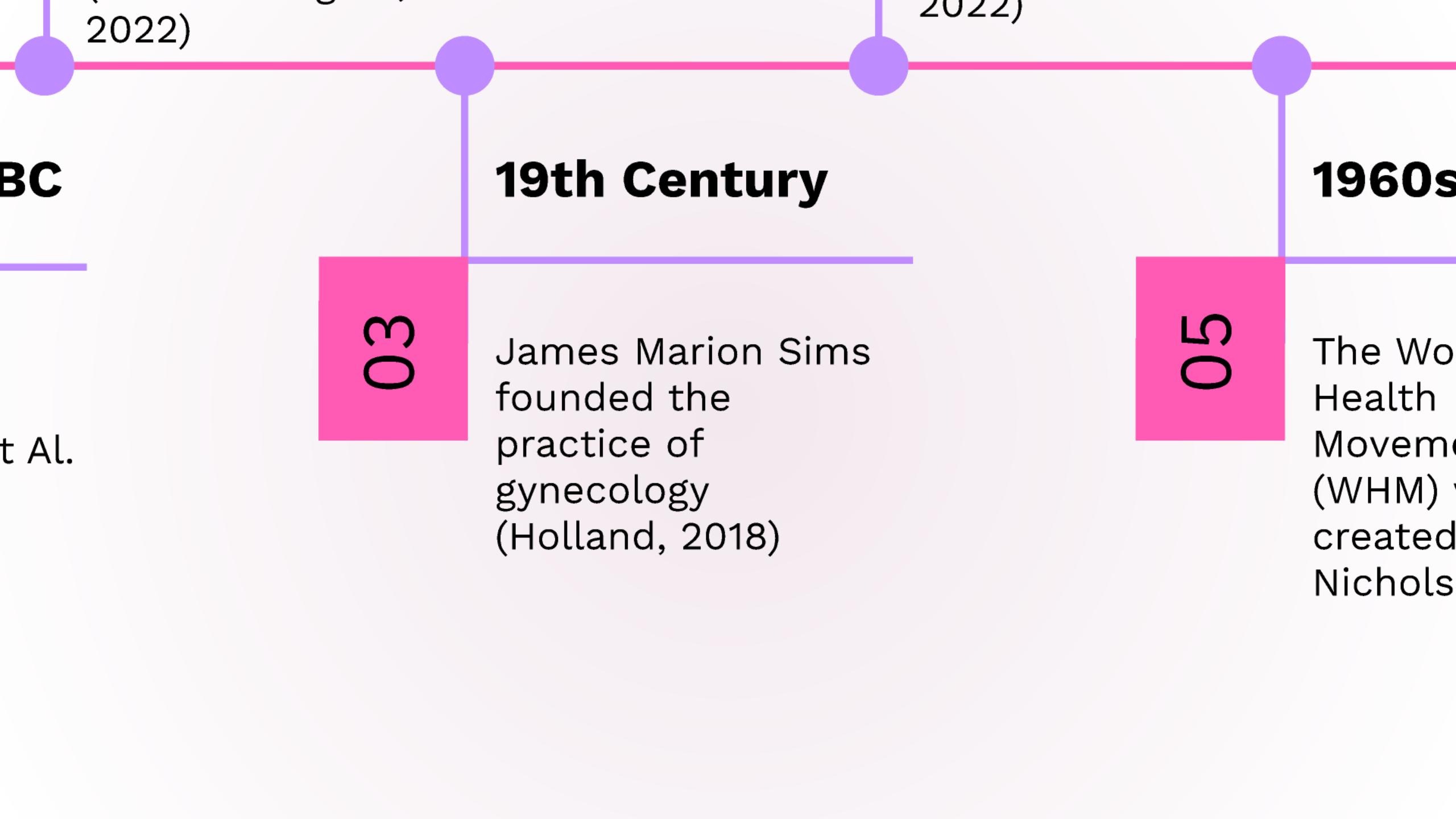
Hysteria was used
to control, imprison
and violate women
(Reader's Digest,
2022)

04

1890

Woman protest symposium 2022

19th Century



ury

used
prison
omen
est,

04

1899

Women underwent dangerous procedures for “insanity symptoms” (Reader's Digest 2022)

06

19

Hy
wi
Al.

19th Century

1960s and 1970s

“...psychosomatic symptoms” (Reader's Digest 2022)

Hysterical neurosis was removed from the DSM-III (American Psychiatric Association, 1980) (Al. 2022)

ury

n Sims

8)

1960s and 1970s

05

The Women's Health Movement (WHM) was created (F H Nichols, 2000)

07

Women are allowed clinical trials (Epker, 2022)

1993

erwent dangerous
for “insanity
(Reader's Digest

06

1980

Hysterical neurosis was deleted
within the 1980 DSM-III. (Tasca Et
Al. 2022)

1960s and 1970s

1993

within the 1980 DSM-III. (Tasca Et Al. 2022)

and 1970s

men's
ent
as
F H
2000)

1993

07

Women are now
allowed in
clinical trials
(Epker, 2023)

Present State of Women's Healthcare

50%

more likely to
be
misdiagnosed of
a heart attack

(Epker, 2023)

50%

more likely to
die within a year
of a heart
attack.

(Epker, 2023)

Men and women both
have different symptoms
for many health
problems, but mens
symptoms are the
default.

(Eva Epker, 2023)

34%

of studies
across
healthcare
conditions
analyze data by
sex.

(Epker, 2023)

50%

more likely to
be
misdiagnosed of
a heart attack

(Epker, 2023)

50%

more likely to
die within a year
of a heart
attack.

(Epker, 2023)

34%

of studies
across
healthcare
conditions
analyze data by
sex.

(Epker, 2023)

In over 700
diseases women
are diagnosed

4.5 years

later than men

(Reuters 2019)

Women are
diagnosed with
cancer

2.5 years

later than men

(Reuters 2019)

What does this mean about our data?



At any time, our current data:

- is 2.5 years behind in cancer diagnoses
- 4.5 years behind in over 700 other diseases
- 50% of heart attack diagnoses in women are misdiagnosed.
- 66% of our studies do not accurately represent both genders, and mens symptoms are the default.

Without incorporating these differences in an artificial intelligence algorithm, the output may be incorrect. This can lead to dangerous consequences for patients.

(Shehmir, 2022)

Good AI starts
with, and relies
on, good data.

(Epker, 2023)

It is “fundamentally wrong” to treat women based on research that was performed on men, says Marek Glezerman, professor emeritus of obstetrics and gynecology at the Sackler School of Medicine in Tel Aviv

(Schreyer, 2016)

Reducing Bias

Healthcare AI

(Shehmir, 2023)

- Diverse AI development team
- Regulatory supervision from government and academic bodies
- Only use high-quality data

(Dilmegani, 2023)

- Use a data-centric approach
- Assess where bias may be present
- Strategize ways in which to limit bias, whether by technical or organizational actions.
- Decide where automated decision making should replace human-work and vice versa.
- Use a multidisciplinary approach

Women's Healthcare

- Define women's health
- Data generation: utilizing claims data
- Try to utilize Insurance claims data
- Data collection: Using and reporting data that is sex-disaggregated

(Burns et al. 2023)

Healthcare AI

(Shehmir, 2023)

- Diverse AI development team
- Regulatory supervision from government and academic bodies
- Only use high-quality data

(Dilmegani, 2023)

- Use a data-centric approach
- Assess where bias may be present
- Strategize ways in which to limit bias, whether by technical or organizational actions.
- Decide where automated decision making should replace human-work and vice versa.
- Use a multidisciplinary approach

Women's Healthcare

- Define women's health
- Data generation: utilizing claims data
- Try to utilize Insurance claims data
- Data collection: Using and reporting data that is sex-disaggregated

(Burns et al. 2023)

Conclusion

Bibliography

- Burns, Delaney, et al. "Closing the Data Gaps in Women's Health." McKinsey & Company, McKinsey & Company, 3 Apr. 2023, www.mckinsey.com/industries/life-sciences/our-insights/closing-the-data-gaps-in-womens-health.
- Davenport, Thomas, and Ravi Kalakota. "The Potential for Artificial Intelligence in Healthcare." Future Healthcare Journal, U.S. National Library of Medicine, June 2019, www.ncbi.nlm.nih.gov/pmc/articles/PMC6616181/.
- Dilmegani, Cem. "Bias in AI: What It Is, Types, Examples & 6 Ways to Fix It in 2023." AIMultiple, 11 Sept. 2023, research.aimultiple.com/ai-bias/.
- Dilmegani, Cem. "Data-Centric AI: What It Is & 3 Best Practices to Adopt It in 2023." AIMultiple, research.aimultiple.com/data-centric-ai/. Accessed 16 Sept. 2023.
- Dilmegani, Cem. "Top 18 AI Use Cases in Healthcare Industry in 2023." AIMultiple, research.aimultiple.com/healthcare-ai-use-cases/. Accessed 14 Sept. 2023.
- Epker, Eva. "Artificial Intelligence in Women's Health: The Pros, the Cons, and the Guardrails Needed to Improve Care." Forbes, Forbes Magazine, 4 Aug. 2023, www.forbes.com/sites/evaepker/2023/08/01/artificial-intelligence-in-womens-health-the-pros-the-cons-and-the-guardrails-needed-to-improve-care/?sh=1d6418474c87.
- "Gender Equity." European Institute for Gender Equality, eige.europa.eu/publications-resources/thesaurus/terms/1262?language_content_entity=en. Accessed 14 Sept. 2023.
- Holland, Brynn. "The 'father of Modern Gynecology' Performed Shocking Experiments on Enslaved Women." History.Com, A&E Television Networks, www.history.com/news/the-father-of-modern-gynecology-performed-shocking-experiments-on-slaves. Accessed 16 Sept. 2023.

- Javaid, Shehmir. "What Is AI Bias in the Healthcare and How to Avoid It in 2023." AIMultiple, research.aimultiple.com/ai-bias-in-healthcare/. Accessed 16 Sept. 2023.
- Kendra Cherry, MSEd. "Understanding Hysteria in the Past and Present." Verywell Mind, Verywell Mind, 13 Oct. 2022, www.verywellmind.com/what-is-hysteria-2795232#:~:text=During%20the%20Victorian%20era%2C%20the,a%20dissociative%20or%20somatic%20disorder.
- Nichols, FH. "History of the Women's Health Movement in the 20th Century." Journal of Obstetric, Gynecologic, and Neonatal Nursing: JOGNN, U.S. National Library of Medicine, Feb. 2000, [pubmed.ncbi.nlm.nih.gov/10660277/#:~:text=The%20Women%27s%20Health%20Movement%20\(WHM,during%20the%201980s%20and%201990s.\)](http://pubmed.ncbi.nlm.nih.gov/10660277/#:~:text=The%20Women%27s%20Health%20Movement%20(WHM,during%20the%201980s%20and%201990s.)).
- Schreyer, Natalie. "Most Medical Research Is Done on Men. That's a Deadly Problem." Mother Jones, 21 July 2016, www.motherjones.com/environment/2016/07/men-women-health-inquiring-minds/#:~:text=But%20according%20to%20Gleberman%2C%20about,could%20confound%20the%20study%20result.
- "The Shocking History of Female Asylums - Reader's Digest." Readers Digest, www.readersdigest.co.uk/inspire/life/the-shocking-history-of-female-asylums. Accessed 16 Sept. 2023.
- Tasca, Cecilia, et al. "Women and Hysteria in the History of Mental Health." Clinical Practice and Epidemiology in Mental Health : CP & EMH, U.S. National Library of Medicine, 2012, www.ncbi.nlm.nih.gov/pmc/articles/PMC3480686/.
- Tone, Andrea, and Mary Koziol. "(F)Ailing Women in Psychiatry: Lessons from a Painful Past." CMAJ : Canadian Medical Association Journal = Journal de l'Association Medicale Canadienne, U.S. National Library of Medicine, 22 May 2018, www.ncbi.nlm.nih.gov/pmc/articles/PMC5962395/#:~:text=By%201942%2C%2075%25%20of%20the,lobotomized%20by%20doctors%20were%20women.
- "Women Are Diagnosed Years Later than Men for Same Diseases, Study Finds." NBCNews.Com, NBCUniversal News Group, 26 Mar. 2019, www.nbcnews.com/health/health-news/women-are-diagnosed-years-later-men-same-diseases-study-finds-n987216.