

# The Environmental, Healthcare, and Societal Impact of Asthma Pathway in the UK: A Cost-of-Illness Study

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## Introduction

- Asthma is a common chronic respiratory condition, affecting millions of people worldwide<sup>1</sup> and about 12% of the United Kingdom (UK) population<sup>2</sup>
- Despite adequate treatment, asthma patients may experience loss of disease control with poor health related quality of life (HRQoL) and potentially death<sup>3</sup>
- Use of inhaler therapies has been associated with greenhouse gas (GHG) emissions<sup>4</sup>
- A comprehensive analysis on the overall environmental, healthcare, and societal impacts of the asthma pathway is needed

## Study Objectives

- Estimate the environmental footprint, healthcare and societal impacts from diagnosis to disease management in the UK
- Evaluate the total economic burden across the entire asthma pathway

## Methods

### Cost-of-Illness (Col) Model

- A prevalence-based Col framework was developed to map, quantify the broader environmental, healthcare and societal impacts associated with asthma in the UK
- The analytical approach included three key steps (Figure 1 and Table 1):
  - Mapping the UK asthma pathway
  - Developing an impacts framework to establish the direct and indirect impacts at each stage of the pathway
  - Developing the executable economic model

Figure 1: Components of the Col Model

Asthma Pathway	Conceptualising the patient pathway including diagnosis, treatment review, and the different possible journeys through the pathway
Impacts Framework	Identifying the direct and indirect impacts on NHS costs, GHG emissions, patient travel costs, HRQoL and productivity losses created due to asthma
Economic Model	Translating the asthma pathway and related impacts framework into an economic model to estimate the monetary value of the pathway impacts

Non-monetary impacts (e.g., HRQoL, mortality, and GHG emissions), were first **estimated in natural units** and then **converted into monetary values** using standard approaches

GHG, greenhouse gas emissions; HRQoL, health related quality of life; NHS, National Health Service

- Model inputs were derived through a focused literature review and respiratory clinical expert opinion
- Non-monetary impacts (HRQoL reduction, increased mortality, and GHG emissions) were estimated in natural units and converted into monetary values
- The model estimated the total economic burden of asthma at both a population and patient level for 2022 and over 2022-31 in net present value (NPV)
- Comparisons focused on non-severe uncontrolled and controlled patients as these subgroups are targeted and affected more by environmental policies

## Methods (continued)

Table 1: Key patient activities under each asthma pathway stage and the corresponding direct and indirect impacts

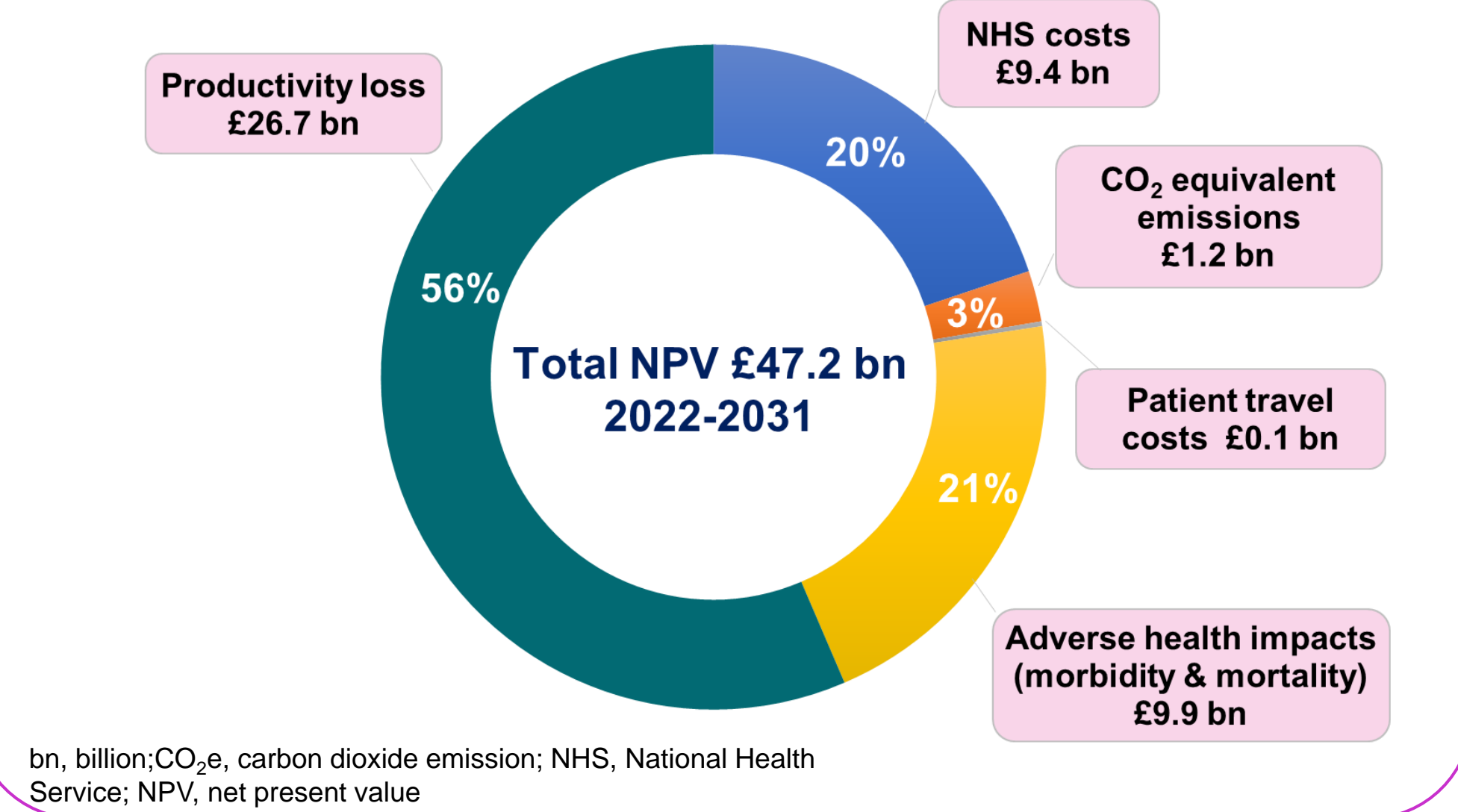
Direct impacts	Asthma pathway stages		
	Diagnosis stage	Maintenance treatment	Uncontrolled asthma treatment
NHS costs	HCP and tests	GP/nurse time and tests, controller inhaler, other medications	Secondary care usage (e.g., ambulance, call emergency 999, hospital admissions), reliever inhaler and OCS tablets
GHG emissions	Running facilities, travel	Inhaler usage, running facilities, travel	Reliever inhaler usage and OCS tablets usage
Patient travel costs	Travelling to and from appointments		
Indirect impacts	HRQoL and productivity		

GHG, greenhouse gas emissions; GP, general practitioners; HCP, healthcare professional; HRQoL, health related quality of life; NHS, National Health Service; OCS, oral corticosteroids

## Results

- The total monetary value of impacts due to asthma pathway over the period 2022-31 was estimated at £47 billion (Figure 2)
- Indirect impacts such as loss of productivity and adverse health impacts accounted for 77% of the total costs (Figure 2)

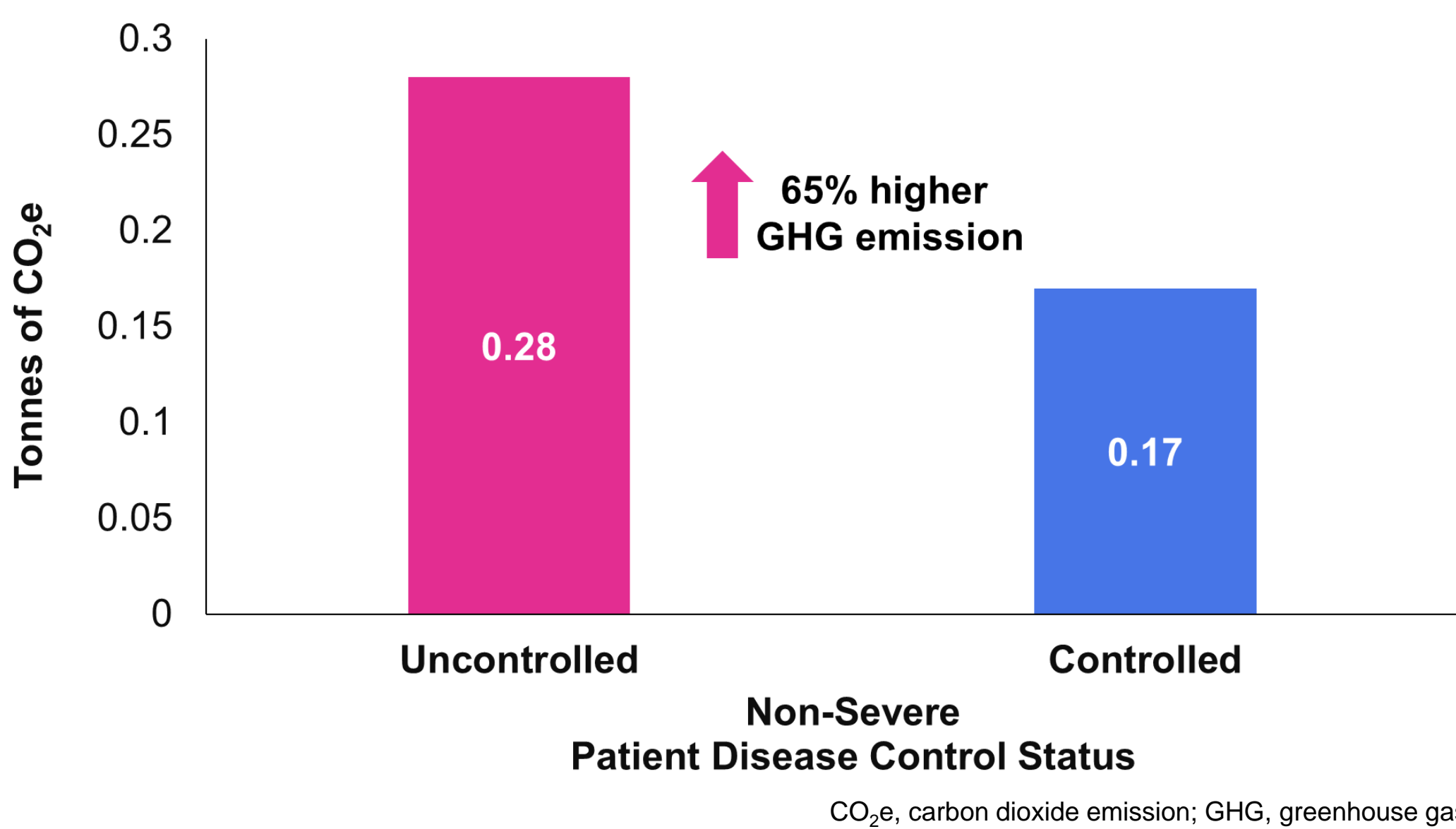
Figure 2: Total Estimated Impact of Asthma Pathway



### 2022

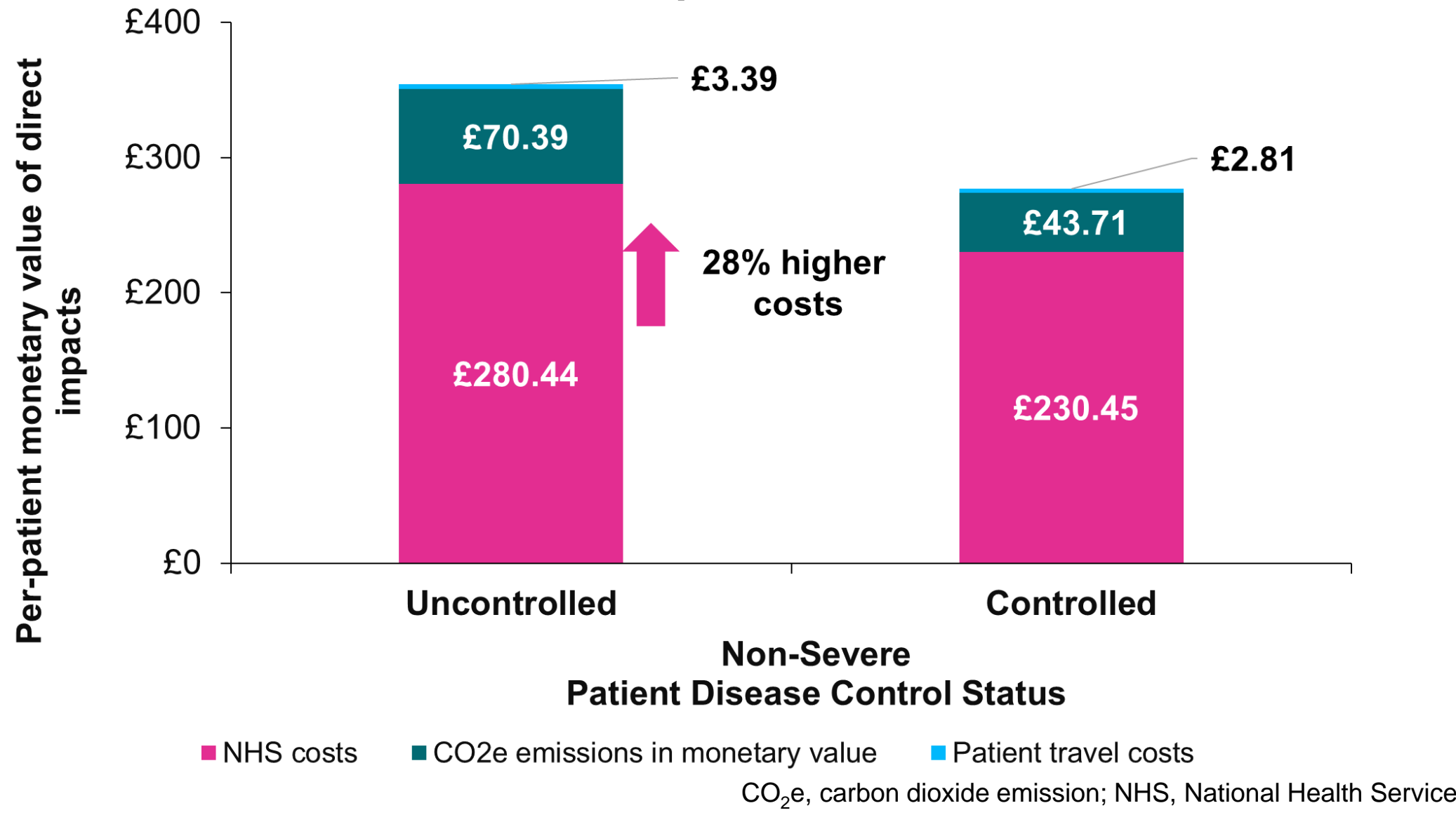
- A non-severe uncontrolled patient generated on average 65% higher GHG emissions compared with a non-severe controlled patient (Figure 3)
- The total direct impacts generated per non-severe uncontrolled asthma patient were 28% higher compared with a controlled asthma patient, with an estimated 22% increase in NHS costs (Figure 4)
- The total direct impacts per severe asthma patient was 4 times higher compared to a non-severe controlled patient

Figure 3: Per-patient GHG emissions associated with asthma care of controlled and uncontrolled asthma in 2022



## Results (continued)

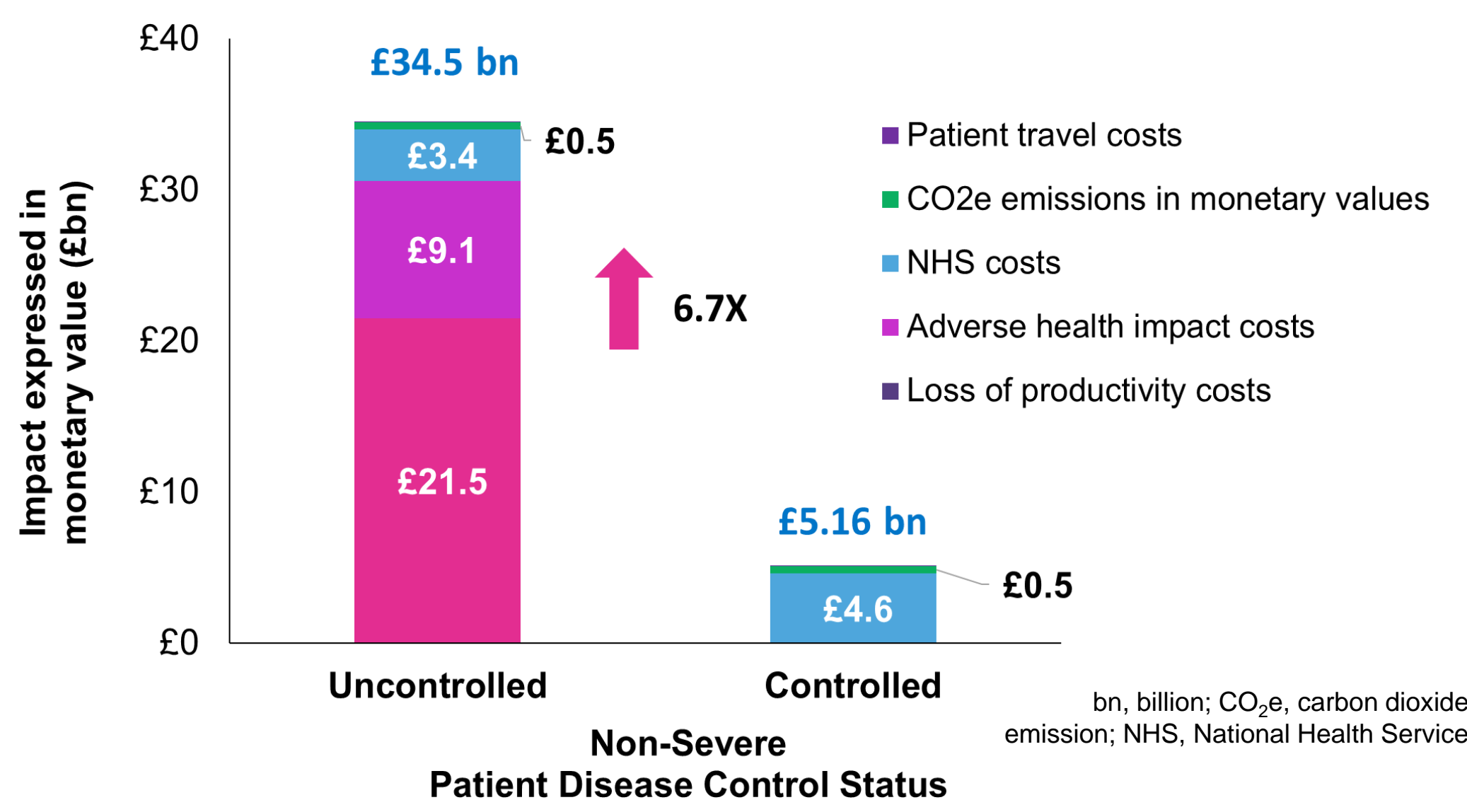
Figure 4: Total direct impacts generated per non-severe asthma patient in 2022



### 2022-31

- Total impact of non-severe uncontrolled asthma was expected to be 6.7 times higher than the total impact of controlled asthma over 2022-31 (Figure 5)
- Higher costs associated with non-severe uncontrolled patients were primarily due to reductions in patient HRQoL and productivity losses

Figure 5: Total direct and indirect impacts from 2022-2031



## Conclusions

- This is the first comprehensive study to holistically estimate the impacts of the entire asthma pathway
- This analysis suggests that uncontrolled asthma significantly impacts the economy, environment, and patients' health emphasizing the need for a more holistic approach to manage asthma
- Future policy design to counteract the asthma carbon footprint should place the patient at the centre of decision-making without compromising favorable health outcomes

## References

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## Acknowledgments

We would like to acknowledge F. Sandri, S. Panigone, H. Lewis, R. Stork, and M. Frias for their technical advice, general support, and contribution to the study and poster design