

Evaluating Biogen's Sustainability Strategy: The Customer Perspective

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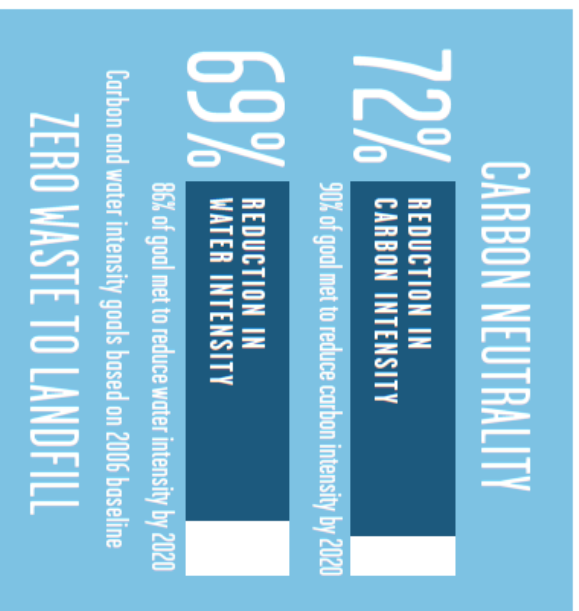
Outline

- Project Introduction
- Methodology
- Findings
 - Patient Awareness
 - Patient Advocacy Networks
 - Healthcare Providers
 - Insurance Providers
 - Other Stakeholders
- Distilling What Customers Value
- Roadmap for Biogen

PROJECT INTRODUCTION

Biogen Is A Leader In Sustainability

- Proactive implementation through many diverse programs
- Strong company culture of sustainability
- Focus on climate change initiatives



Biogen As A Biopharma Company

- “Patients First” mantra with the development of safe, effective drugs as the top priority
- 7,000+ Employees Globally
- Distributes in 70 Countries
- Over \$11 billion in revenues in 2016

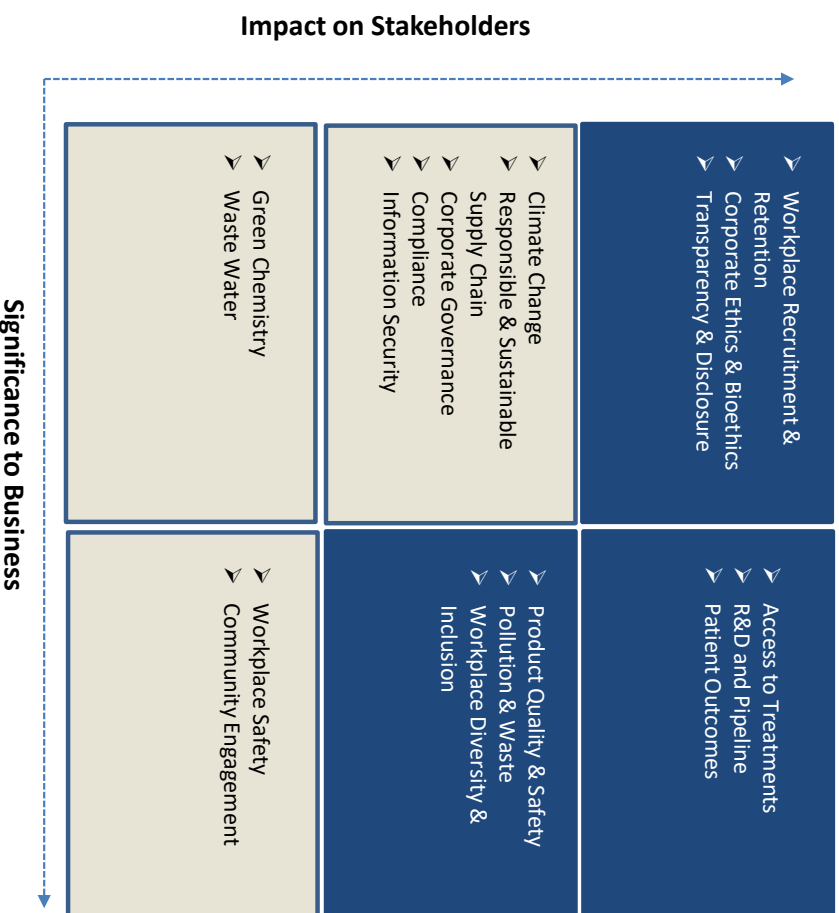
High Priority Pipeline Programs

Alzheimer's disease	<p>Aducanumab (Aβ mAb)</p> <ul style="list-style-type: none"> - Antibody that binds to and may reduce amyloid plaques from the brain, potentially slowing the progress of the disease
Multiple Sclerosis	<p>Opicinumab (anti-LINGO)</p> <ul style="list-style-type: none"> - Remyelinating agent
	<p>BIIB061</p> <ul style="list-style-type: none"> - Oral remyelinating agent
Spinal Muscular Atrophy	<p>Nusinersen</p> <ul style="list-style-type: none"> - Developed in collaboration with Ionis Pharmaceuticals
Neuropathic Pain	<p>BIIB074 (Nav1.7 inhibitor)</p> <ul style="list-style-type: none"> - Oral small molecule that aims to block a key receptor in the modulation of pain with potential indications for trigeminal neuralgia and sciatica
Inflammatory Bowel Disease	<p>Amiselimod (MT-1303)</p> <ul style="list-style-type: none"> - Potential indications for ulcerative colitis and Crohn's - In-licensed from Mitsubishi Tanabe Pharma Corporation

Source: Biogen 2015 Corporate Citizenship Report, Biogen 2016 Form 10-K

Patient-Facing Social Sustainability Is Most Material

- 2017 Materiality Assessment reveals that patient-related issues are most material
- Access to treatments is key social sustainability issue in healthcare
- Environmental issues also feature prominently



- **PATIENTS**
 - Patient Health Outcomes
 - Access to Treatments
 - Information Security
- **PRODUCTS**
 - Product Quality & Safety
 - R&D and Pipeline
 - Responsible & Sustainable Supply Chain
- **ENVIRONMENT**
 - Climate Change
 - Water & Waste Water (Operations)
 - Pollution & Waste
- **WORKPLACE**
 - Recruitment and Retention
 - Workplace Diversity & Inclusion
 - Workplace Health & Safety
- **GOVERNANCE & ETHICS**
 - Transparency & Disclosure
 - Ethical Business Practices
 - Corporate Governance
 - Compliance
- **COMMUNITY**
 - Community Engagement

Source: Internal Biogen Documents

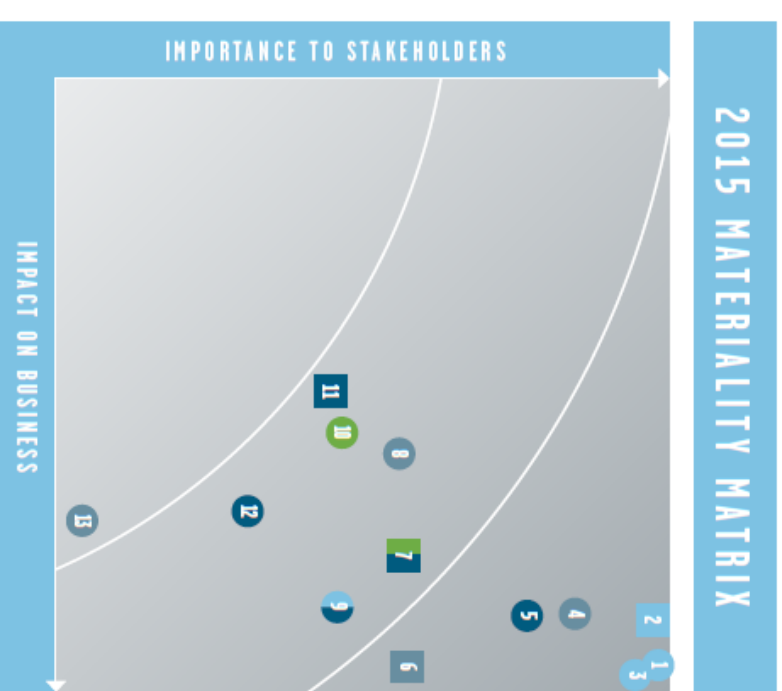
Materiality Assessment Lacks Customer Perspective

- Many external stakeholders have been brought into the discussion
 - Advocacy groups
 - Competitor or peer companies
 - Academic perspectives
 - Consultants
 - Investors
 - Etc.
- Customers are primary beneficiaries of Biogen's business, but they are not consulted as materiality matrix stakeholders
- Need to assess customer priorities

1 Patient Health Outcomes (E)	8 Corporate & Foundation Giving/Community Engagement (I/E)
2 Access to Treatment/Pricing/Healthcare-System Cost Burdens (E)	9 Diversity and Inclusion (I/E)
3 R&D/Innovation (I/E)	10 Environmental Impacts (E)
4 Stakeholder Engagement (E)	11 Regulatory/Legal (I/E)
5 Ethics/Governance (I/E)	12 Talent Management/Workplace Culture/Health & Safety (I)
6 Intellectual Property (I/E)	13 Employee Volunteerism (E)
7 Supply Chain ESG (E)	

WHERE IMPACT OCCURS I = Internal E = External I/E = Internal/External

● Improving Lives	● Driving Engagement
● Rethinking Resources	● Acting Responsibly



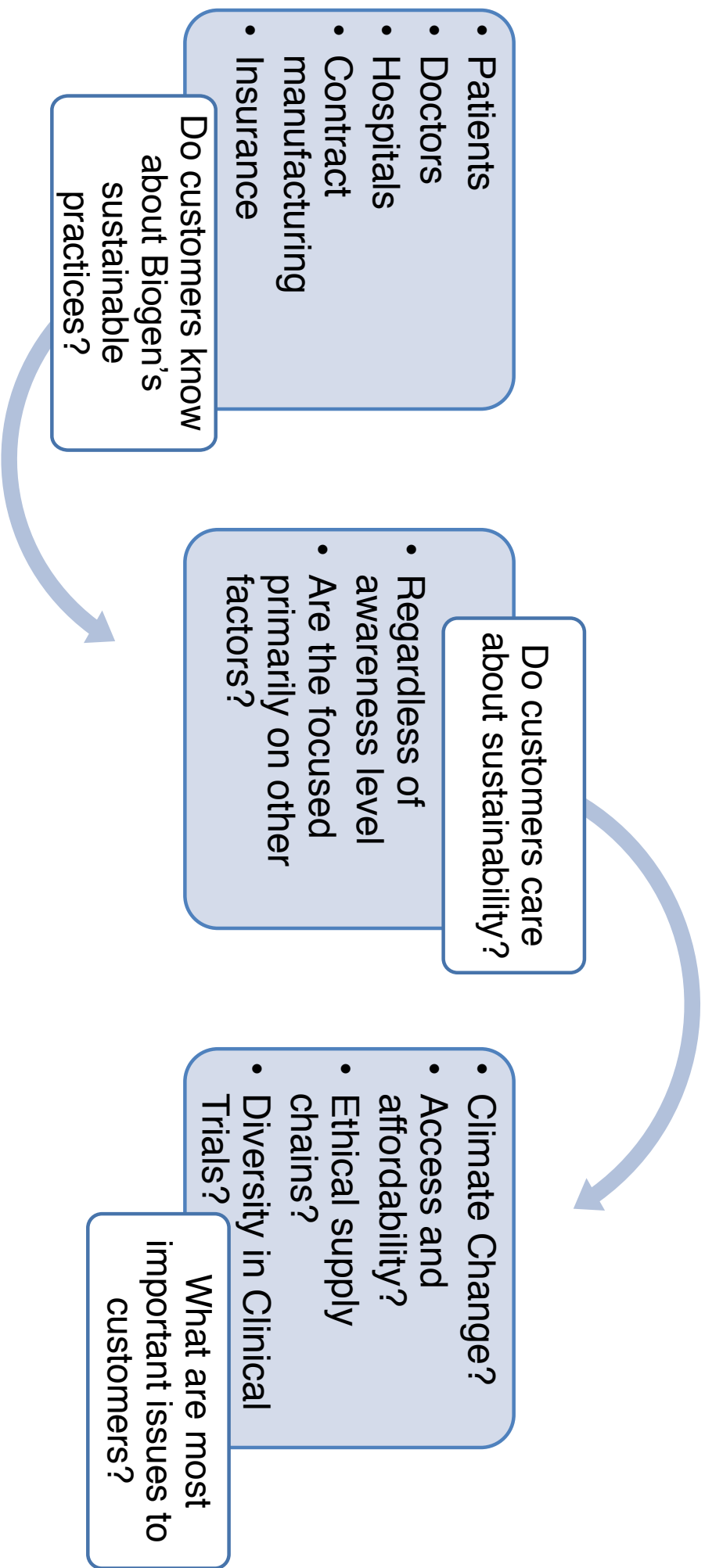
Source: Biogen 2015 Corporate Citizenship Report

Problem Statement

Biogen invests significant capital and effort to ensure it conducts its business in the most environmentally and socially sustainable way possible, yet it is unsure of whether its customers are aware of its initiatives and what their priorities are.

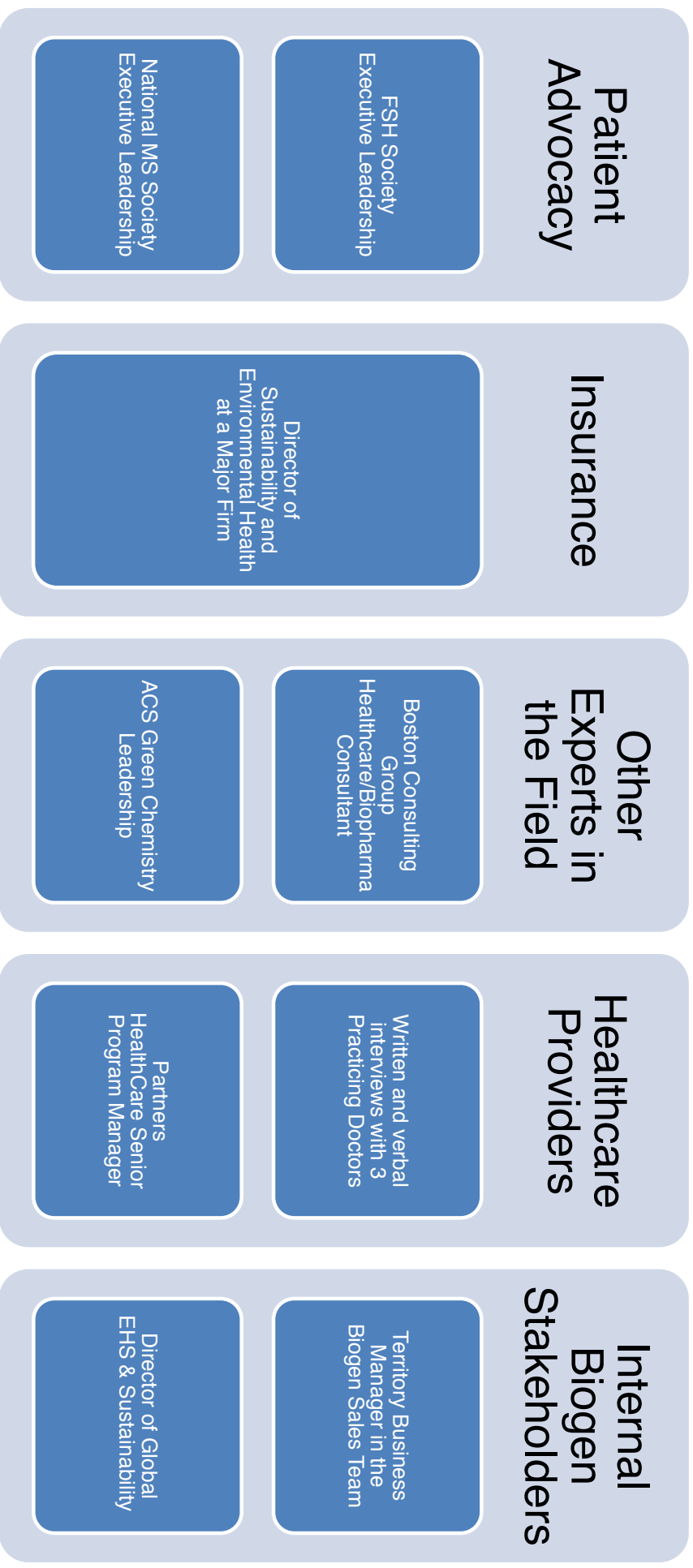
Biogen seeks a deeper understanding of the awareness and importance of its sustainability efforts to its customers (patients, doctors, hospitals, insurance companies, contract manufacture clients), with an eye towards how it can better align its sustainability programs towards current customer needs and future trends.

Key Questions: What Do Customers Care About?



METHODOLOGY

Primary Research: Interviews of Internal & External Stakeholders



Primary Research: A Patient Survey

- Online survey of patients (n=115)
 - A seven question survey sent through an e-list by the FSH Society to individuals with FSH or who are caregivers for individuals with FSH (see Appendix A for list of questions)
- Asked patients to identify most important issues they are concerned about that relate to their medications and the companies that make their medications
 - Not limited to sustainability issues
- Provided free-text space for additional thoughts about sustainability in the pharmaceutical and biopharmaceutical industry
- Not intended to be a representative sample of all patients with a serious illness*

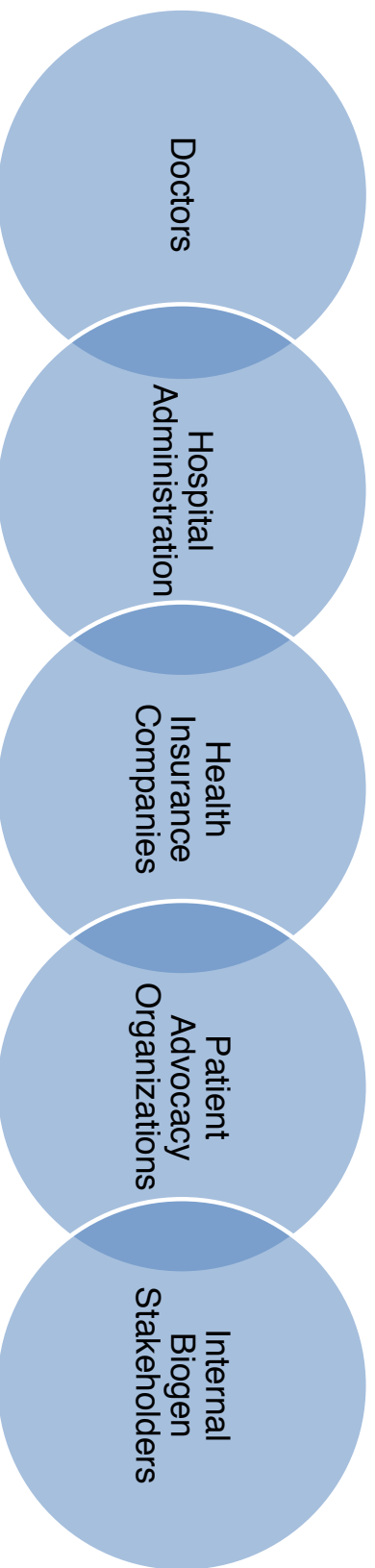
Special Thanks to the Facioscapulohumeral Muscular Dystrophy Society for their help!



*See Appendix A for a detailed explanation of the survey audience and methodology.

Primary Research: Stakeholder Interviews

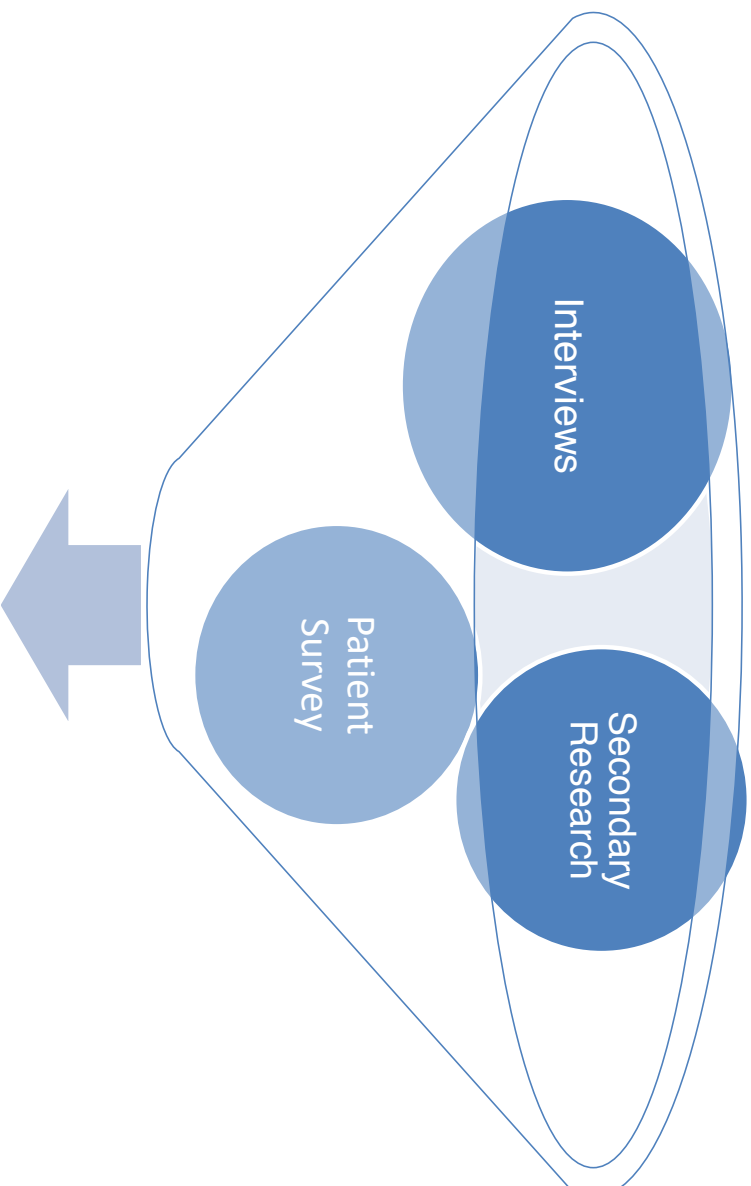
- Series of stakeholder interviews across the field
 - 30-60 minute qualitative research interviews and written interviews
- Asked stakeholders about their primary sustainability interests and needs
 - Not limited to environmental sustainability – explicitly included social issues
 - Asked about shifting emphasis and potential for changed focus
 - See Appendix B for interview guides



Secondary Research: Databases, Journals & Web

- Searched online databases for existing research on sustainability efforts by the pharmaceutical and biopharmaceutical industries
- Conducted web searches for news, existing and potential regulations, and other relevant content
- Read corporate citizenship reports and supplier conduct agreements of competitors and partners

Tying It All Together To Gain Perspective



Customer Stakeholder Awareness & Perceptions of Sustainability

FINDINGS

Survey of Members of the FSH Society

PATIENTS

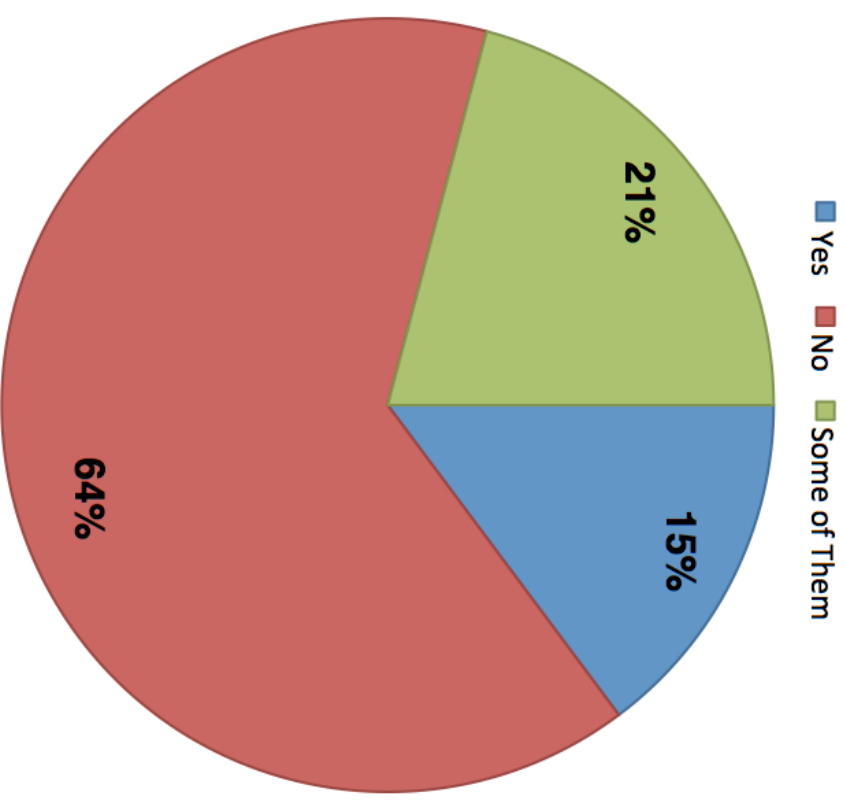


Patients Generally Don't Know Who Makes Their Drugs

Question: Do you know which drug companies make the medicines you are prescribed?

Answers from **115** Respondents:

- No: 74
- Yes: 17
- Some of Them: 24



Patients Generally Aren't Aware Of Sustainability Efforts

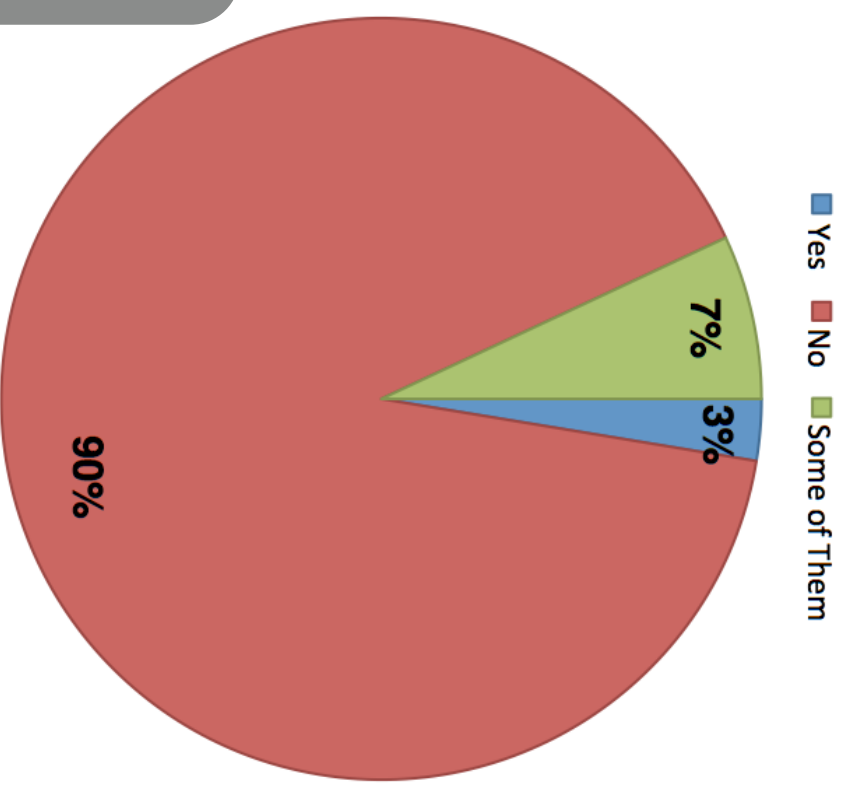
Question: Do you know anything about the sustainability efforts of the companies that make your medicines, or of the biopharma industry in general?

Answers from **115** Respondents:

- No: 104
- Yes: 3
- Some of Them: 8

"I have not read anything in the media about this topic. Sustainability issues relating to the pharmaceutical industry have not been publicized to the general public. More should be done to publicize them and make the information available."

~Patient with FSH

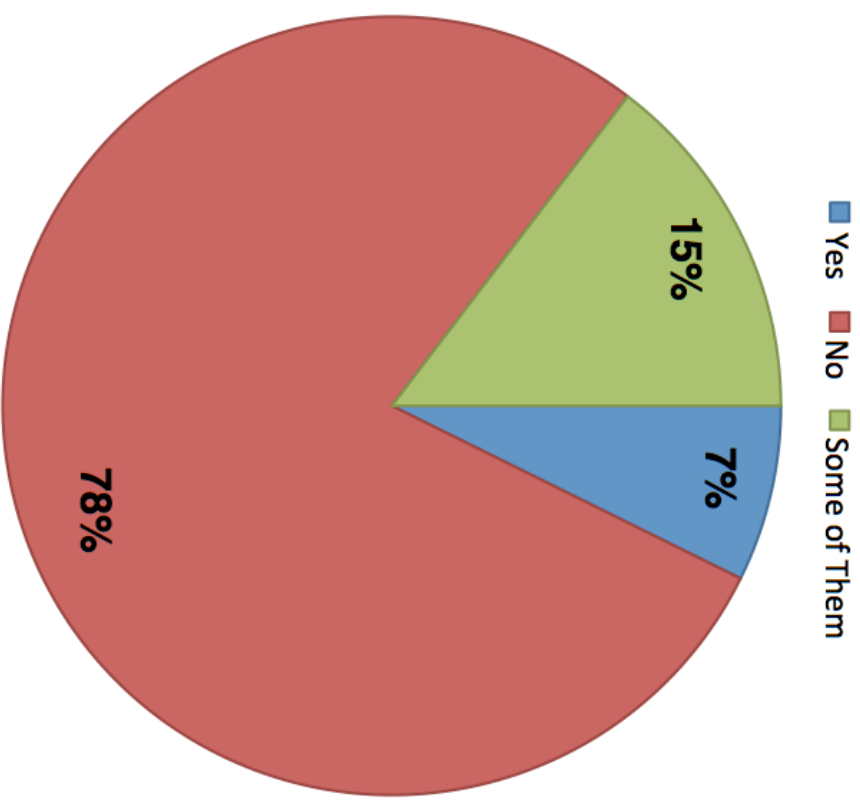


Even Relatively Educated Patients Aren't Aware

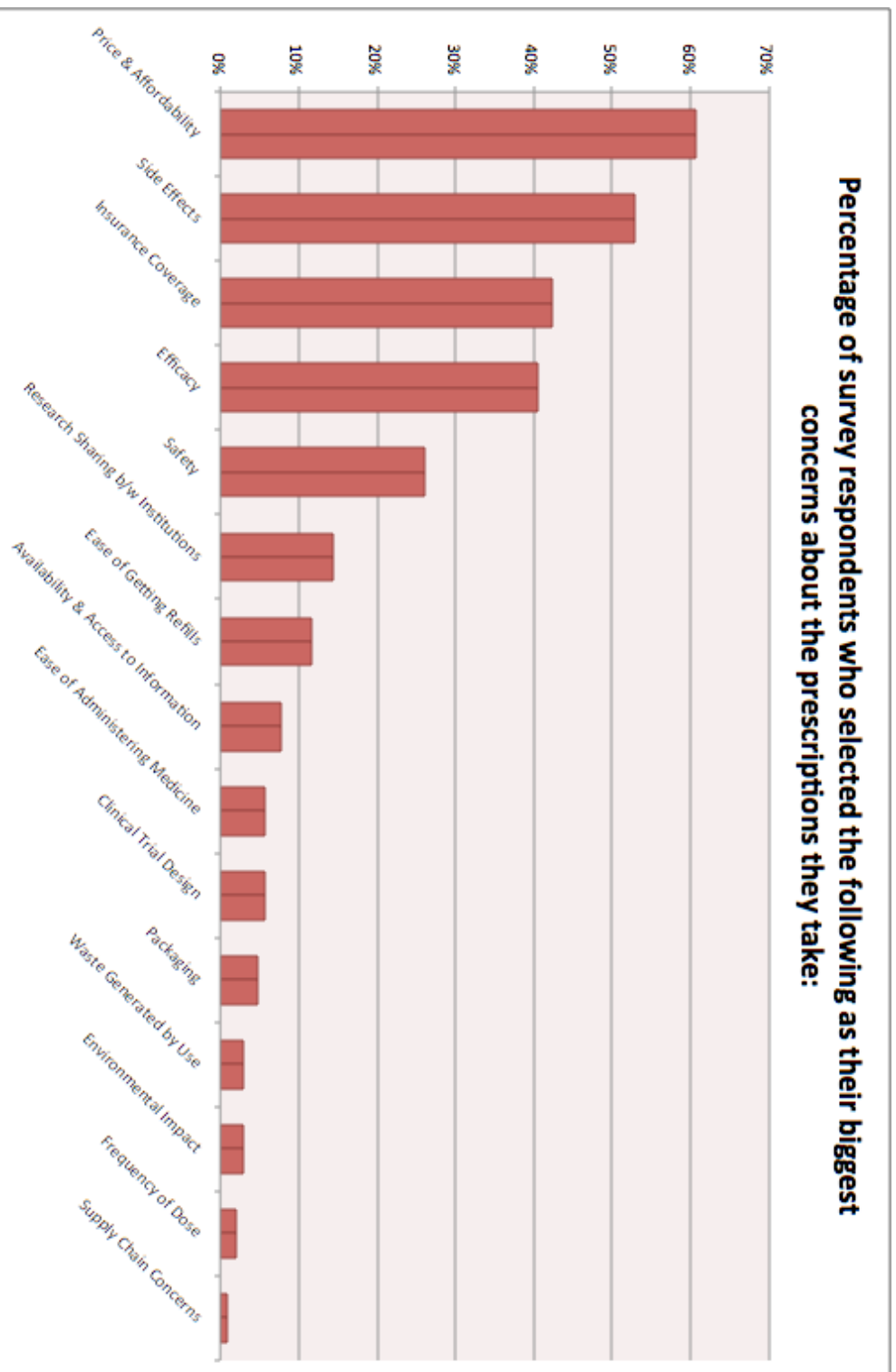
Question: For those who know who makes some or all of their medicines, are they aware of sustainability efforts of the drug companies?

Answers from 41 Respondents:

- No: 32
- Yes: 3
- Some of Them: 6



Patients Are Focused On A Variety Of Issues (104 Respondents)



Patient Perceptions Of Social Sustainability

Patients are focused on the social sustainability efforts of the biopharmaceutical industry but generally do not recognize these issues as aspects of social sustainability. The majority of their concerns relate to access to medicines, affordability, and transparency of pricing.

Selected Quotes

- "This is the first time I've heard this issue addressed. I don't think that the pharmaceutical industry has any sustainability initiatives in real terms. Would be great if they did."
- "Social/Access: government intervention to ensure that medications vital to life are not excluded from delivery to particular pockets of society with limited financial resources."
- "No - it's actually the last thing that concerns me about the pharma industry. My main concern is their price gouging in the US and the apparent lack of regulation to combat this."
- "Access for everyone at an affordable price."

21%
of survey respondents who submitted detailed free-form answers mentioned price gouging & transparency as important to them.

29%
of survey respondents who submitted detailed free-form answers mentioned access to medicine as important to them.

18%
of survey respondents who submitted detailed free-form answers mentioned affordability & assistance as important to them.

Patient Perceptions of Environmental Sustainability

6%

of survey respondents who submitted detailed free-form answers mentioned environmental impact from product manufacturing & transport as important to them.

9%

of survey respondents who submitted detailed free-form answers mentioned climate change as important to them.

9%

of survey respondents who submitted detailed free-form answers mentioned packaging waste as important to them.

Patients are minimally aware of environmental sustainability efforts by the healthcare industry. There is some positive awareness of environmental initiatives, and concern about the need to address climate change and environmental issues tied to a medicine's use and disposal.

Selected Quotes

- "Proper disposal of medications is very important. We hear of environmental effects, including contamination of our drinking water supply, from improper disposal of meds. This needs to be addressed by the pharmaceutical companies, as well as by governmental agencies."
- "I personally would love to know how the chemicals are resourced to making certain medications - Are they natural or synthetic? Does the manufacturing plant have any sustainability or energy conservation efforts?"
- "I am disturbed by what I read about Bayer's practices affecting bees. It's important to me that pharmaceutical companies aren't making profits at the cost of the environment and wildlife."

Additional Thoughts From Patients

Patients are aware and concerned about the perceived lack of information sharing between research institutions, universities, government agencies, and other bodies involved in pharmaceutical research and trials.

- "Institutions need to share their knowledge and information so that more headway will be made in treating illnesses and diseases."

Environmental and social sustainability efforts are not mutually exclusive – patients generally care about both, even though their primary concern may be about affording and getting their prescriptions.

- "Climate change and access to medicine are some really big issues that effect many aspects of our lives."

A repeated theme in the patient's comments is a desire to see packaging "that uses more sustainable elements" as well as "improved waste/disposal methods and systems for medications."

18%

of survey respondents who submitted detailed free-form answers mentioned disposal and recycling of medicines as important to them.

National MS Society & The FSH Society

PATIENT ADVOCACY NETWORKS



Patient Advocacy Organizations

Our interviews with Patient Advocacy Organizations found that patients care about social sustainability but largely are not engaged in any conversations about environmental sustainability.

Important Issues for Patient Advocacy Organizations:

- Easy access to information on drugs and clinical trials
- Sharing of research data, tissue, and other biological materials between researchers and companies to shorten research cycles and achieve savings, which can be passed on to patients
- Effective design and management of clinical trials, including diversity of participants
- Gaining public awareness and advocating for increased access to medicines and promoting affordability and price transparency at the state and federal level
- For MS specifically – lack of basic knowledge including how many people in the U.S. suffer from MS and a growing interest in sharing information through a grassroots network

Pulling It Together: Opportunities In The Patient Space

1. There is room to better educate patients on what biopharma companies are doing in both social and environmental sustainability to address issues they care about
2. Biogen could highlight its partnerships with academia and other institutions more, because the lack of information sharing – or perceived lack of information sharing – between industry, academia and government worries patients and advocates
 - Patients and patient advocacy groups view secrecy as delaying or preventing discovery of treatments and potential cures; knowledge that Biogen is actively working with academia could ameliorate this
3. Increasing price transparency and promoting awareness about social responsibility programs that focus on making life-saving drugs affordable could alleviate misconceptions about price-gouging
4. Biogen could explore a closed-loop supply chain or medication/waste take-back programs. Patients are concerned about the waste resulting from medication packaging as well as how to properly and safely dispose of any unused or expired medications

The sustainability efforts of a company such as Biogen are unlikely to impact patient purchasing behavior, but could impact how Biogen is perceived by its patients and improve general public opinion of the company.

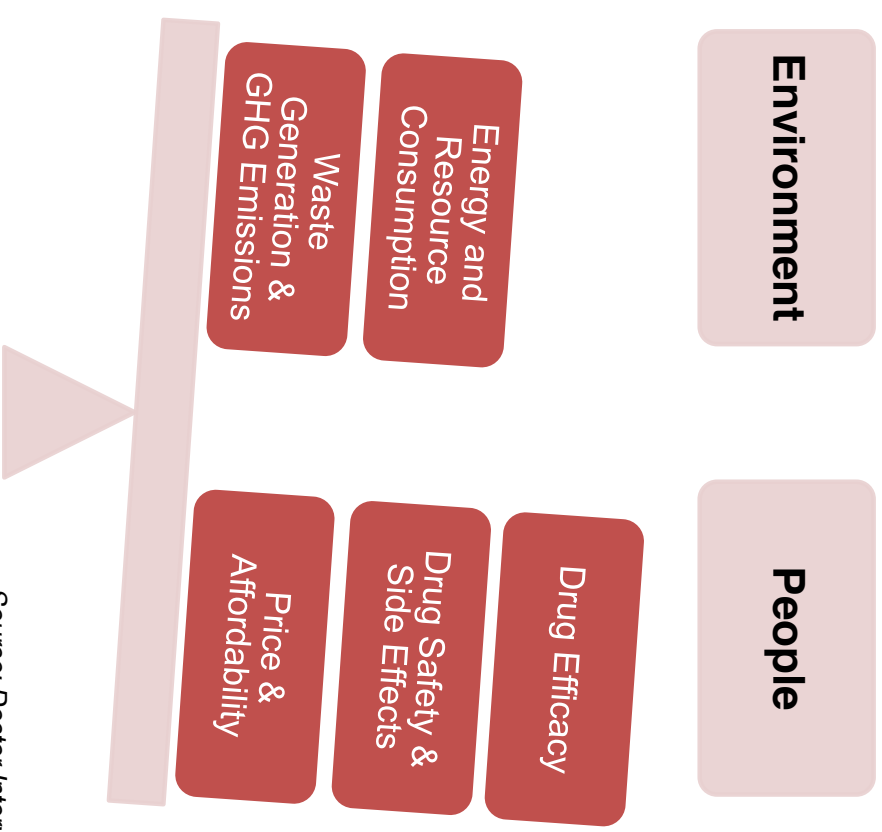
Healthcare Providers

DOCTORS



Doctors Are Singularly Focused On Efficacy and Safety

- Focus on patient health outcomes vastly outweighs any other concern related to drug
- US doctors generally are not aware of environmental sustainability initiatives undertaken by drug companies, nor are they interested
- Doctors often prescribe from formularies, which are influenced by hospitals and insurance providers



Source: Doctor Interviews

Corporate Social Responsibility May Sway Doctors

- According to multiple interviewees, patient health is the most important factor for prescribing intent, thus information about **access** and **affordability** may have positive impact
 - Doctors tend to under-estimate cost of drugs¹
 - Patient adherence is impacted by price, and thus doctors may actively consider price or financial assistance programs when prescribing²
- Study of 300 doctors in Japan found that **doctors were swayed by CSR activities** of a company, especially when efficacy, safety and price were comparable between 2 drugs
 - Impacted by hospital type: doctors in advanced treatment hospitals and hospitals with more than 200 beds were more likely to choose CSR-active companies
 - Impacted by conference attendance of doctors: greater conference attendance increased CSR effects on prescribing intention³
- Anecdotal evidence suggests this impact is less prominent in the US

¹ Schutte et. al, 2016

² Reichert et. al, 2000

³ Uryuhara, 2015

Doctor-Patient Communication is Evolving, So Information Sources Should Too

- Doctor-patient communication often occurs in the short time frame of consultations, therefore most doctors simplify treatment options available to the patient¹
 - Today's consumers are increasingly relying on online sources for prescription drug-related information
 - Direct-to-consumer (DTC) prescription drug brand websites are receiving increasing attention due to the growing number and importance as a consumer information source
 - Perceived DTC website trust was found to be significantly associated with behavioral intention to revisit and use the information obtained from the website²
- There may be an opportunity to leverage existing DTCA to educate patients and doctors about sustainability efforts**
- Explore adding a sustainability sub-site to drug information website and track viewership

The screenshot shows the top navigation bar of the TYSABRI website. It includes links for 'Important Safety Information', 'Prescribing Information', 'Medication Guide', and 'For Healthcare Professionals'. On the right side, there are 'REGISTER' and 'SIGN IN' buttons. Below the navigation bar, there is a search bar with a magnifying glass icon and a 'Find us on' section with icons for Facebook and Twitter. A main navigation menu is visible with links: 'About TYSABRI', 'Relapsing MS', 'Above MS program', 'Additional support', and 'Real TYSABRI stories'. The main content area features a large image of a woman, Jessica, with the text 'LEARN ABOUT JESSICA'S FIGHT' and a 'Learn more from Jessica' button.

Welcome fighters

Learn about TYSABRI® (natalizumab) for relapsing multiple sclerosis (MS)

TYSABRI is for people with relapsing MS who won't give up, give in, or stop fighting. Administered as an infusion once every 28 days, TYSABRI can help people fight for the things that matter. Important things like slowing the progression of physical disability, reducing formation of new brain lesions, and reducing the number of relapses. **See TYSABRI Real Information**

IMPORTANT SAFETY INFORMATION AND INDICATION

Important Safety Information

TYSABRI increases your risk of getting a rare brain infection—called progressive multifocal leukoencephalopathy (PML)—that usually leads to death or severe disability.

www.tysabri.com, accessed 5/17/17

1 Gregory et. al, 2011
2 Huh et. al, 2014

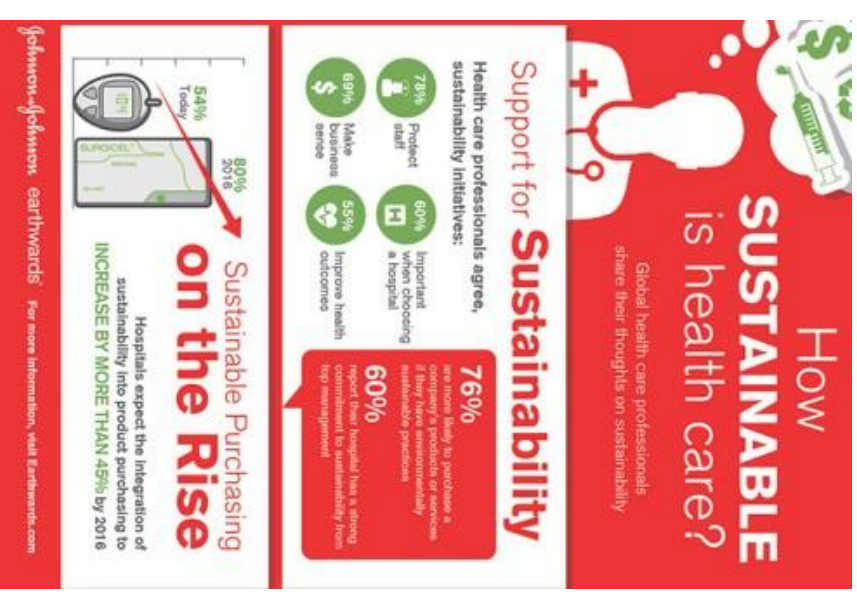
Healthcare Providers

HOSPITALS

Sustainability Is Growing As A Major Hospital Initiative

- Sustainability influences hospital operating culture:
 - One third of US hospitals have committed to environmental goals
 - 80% expect sustainability to be fully integrated into product purchasing
- Many sustainability programs in hospitals started as “grass-roots” initiatives, demanded by staff, patients and visitors
 - E.g. elimination of Styrofoam trays in cafeteria was pushed hard by staff, employees and hospital visitors
 - Vocalization of desire for sustainability became too loud to ignore
- Cost reduction is a major focus to reduce costs to patients:
 - Partners Healthcare to cut \$500M in next 3-5 years

Hospitals’ commitment to sustainability is likely to influence doctors awareness of sustainability issues and may affect prescription choices in the future



Sources: Partners Healthcare, Practice GreenHealth, Johnson & Johnson

Impacts Of Sustainability On Current Hospital Purchasing Behavior Are Mixed

- Majority of procurement practices that involve sustainability focus on medical devices and general supplies, but not drugs
- Johns Hopkins, MGH and similar hospitals have sustainable procurement strategies, supply chain practices, and/or sustainability offices
- Kaiser Permanente and Partners Healthcare emphasize sustainability and social responsibility across the board and may lead the charge with respect to incorporating drug company sustainability into hospital sustainability requirements
- Generally, most sustainability efforts within hospitals are focused primarily on hospital operations, followed by improving the general health of the community

Sources: Hospital Websites & Sustainability Sub-pages

Case Study: “Partners HealthCare has made sustainability a top organizational priority”¹

- Sustainability initiatives focus on three main areas:
 - Patients and Employee: *Patient and employee health and safety*
 - Healthy Environment: *Reducing impact on the earth*
 - Resources: *Controlling health care costs by using resources wisely*
- Programs are run at two levels:
 - National - through cooperation with peer hospitals
 - Local - through local projects, often initiated by employees
- Founded Healthier Hospitals Initiative with group of other sustainability-aware hospitals to promote sustainable initiatives
- Works closely with Practice GreenHealth to further their own and other hospitals’ sustainability commitments



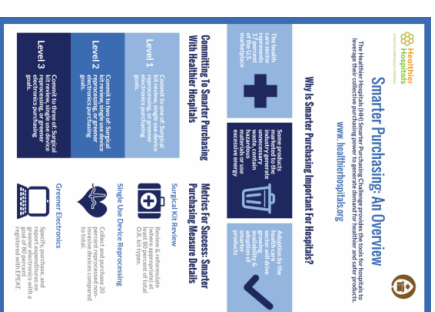
Image Source: <http://www.partners.org/>

¹: <http://www.partners.org/innovation-and-leadership/sustainability/>, accessed 5/16/17

Other sources: <http://www.partners.org/> and Interview with Partners’ Sustainability Program Manager

Case Study: Partners' Active Supply Chain Management To Increase And Promote Sustainable Behavior

- Actively working to promote and expand social and environmental sustainability throughout the organization, and taking an activist stance beyond
 - Focus is still on how vendors can help Partners meet its own sustainability goals
 - Primary concern remains providing the best possible support for patient population
- Currently channeling 40% of procurement through Group Purchasing Organizations (GPOs) to reduce costs and price of care to patients
 - “Smarter Purchasing” seeks to avoid products that generate waste, contain hazardous materials, and use excessive energy
 - Practice GreenHealth, an activist organization, works with the largest GPOs to raise the level of environmental awareness and alter purchasing habits
 - “Greening the Supply Chain” Initiative provides additional leverage to support the manufacture and production of environmentally preferable products



Sources: <http://www.partners.org/>, <https://practicegreenhealth.org/initiatives/greening-supply-chain>, Interview with Partners Sustainability Program Manager

What's Next For Partners?

- Partners still selects formulary drugs based on performance (safety/efficacy) and price, a fact that is unlikely to change
- Secondary considerations are harmful chemical components, input and output products, and waste generated by the medication – this may provide opportunities for Biogen to differentiate itself, both in the short term and long term.

Example: Drug company takeback programs to deal with hazardous waste (from purchased meds, i.e. unused/expired/used injectors, etc.) help Partners reduce cost and therefore better serve patients. These takeback programs could influence formulary decisions in the near future. Implementing a takeback program would make Biogen products more attractive.



Most “smart” and “green” purchasing focuses on general and medical supplies, and medical devices. However, this could reasonably be expected to extend in some capacity to include biopharmaceutical products in the next 5-10 years for those hospitals that are at the forefront of sustainability.

Images Clockwise: www.fda.gov, www.health.harvard.edu, Wikipedia

Integrated Hospitals May Lead The Charge On Drug Company Sustainability Importance

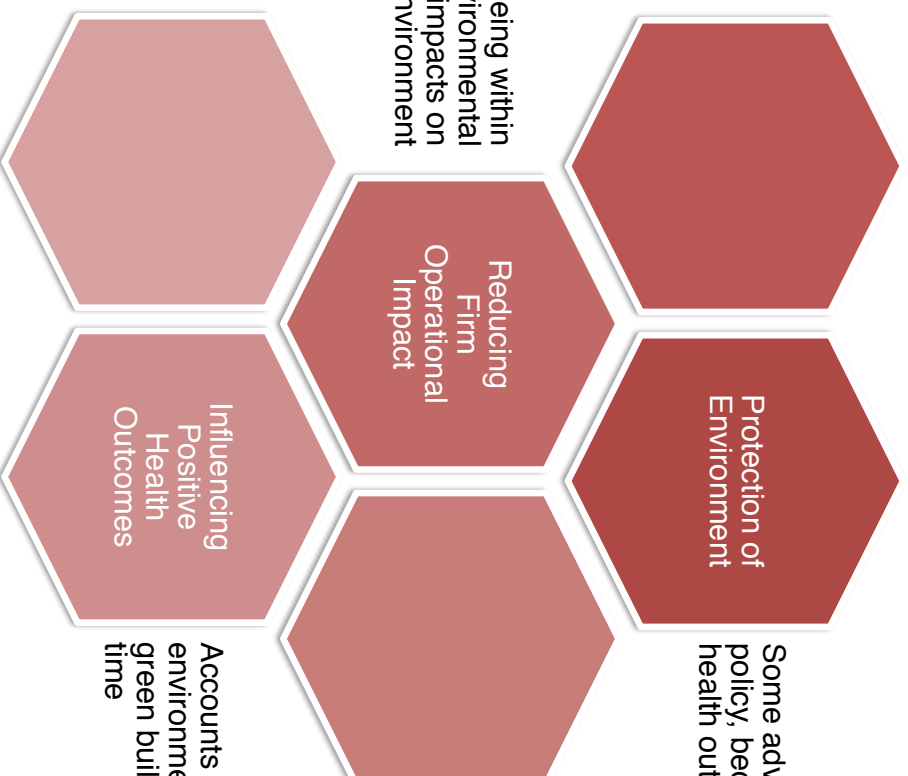
- Interview with Partners Healthcare Sustainable Initiatives Program Manager indicated that sustainability is currently important, and is becoming increasingly prominent in three areas:
 1. Internal operations
 2. Health of patients, doctors, staff, community
 3. R&D laboratories
- Bringing drugs more directly under purview of supply chain sustainability may be the next step, and formularies could be influenced by drug company sustainability
- More than 500 hospitals nationwide currently pledged to one or more sustainability challenges tracked by Healthier Hospitals Initiative, indicating increased interest and awareness
- Other similarly organized hospitals such as Kaiser Permanente also emphasize sustainability and social responsibility across the board and may lead the charge with respect to incorporating drug company sustainability into hospital sustainability requirements

Sources: Interview with Partners Healthcare Sustainable Initiatives Program Manager, Hospital Websites & Sustainability Sub-pages

Payers

INSURANCE PROVIDERS

Insurance Provider Sustainability is Environmentally Focused



Source: Interview with Director of Sustainability and Environmental Health at a major firm

Coverage Is Not Impacted By Drug Company CSR

- Cost, performance and safety drive coverage decisions
- Coverage is decided on a case-by-case basis – there is no situation in which a drug company's sustainability programs would influence decision-making at this time
 - Possibility for corporate social responsibility to be a tie-breaker in the future (unspecified horizon) if two drugs were otherwise equivalent, but not currently the case
 - Primary drivers are how many within coverage patient pool may be affected by coverage decision, and what are the possible outcomes
 - Insurance companies are slow moving and behind the ball on sustainability
- **Caveat:** If a drug company is very transparent about how it determines price, provides justification, and has initiatives to make a drug available to more patients, this could drive awareness about pricing and affordability and may influence coverage decision → potential opportunity for Biogen to increase pricing transparency and thus coverage

Sources: Interview with Director of Sustainability and Environmental Health at major firm

Other Stakeholders

CONTRACT MANUFACTURING & GREEN CHEMISTRY ADVOCATES

Environmental Sustainability Clearly Matters For Contract Manufacturing

- Strong demand among potential contract manufacturing clients for Biogen's environmental initiatives such as energy, resource use and waste reduction
- Most companies have robust supplier behavior contracts that require suppliers to meet certain sustainability standards, with a focus on environmental issues and ethical supply chains
- The Biogen-Contract Manufacturing Client relationship is very different from the Biogen-Patient relationship. In contract manufacturing, environmental sustainability may give Biogen an edge over other suppliers
- Biogen's leading environmental sustainability position may make it a more attractive business partner
 - For example, AbbVie, Samsung, J&J, Genentech, all current Biogen business partners, have robust sustainability reporting and practices both internally and in their supply chains

Sources: CSR Reports, Supplier guidelines and company websites of Biogen partners and customers

Case Study: Johnson & Johnson Is Very Sustainability-Focused

- Several supplier guidelines that relate directly to sustainability:
 - Guideline 4: Respect human and employment rights
 - Guideline 5: Promote the safety, health and well-being of employees
 - Guideline 6: Embrace sustainability and operate in an environmentally responsible manner
 - Guideline 8: Disclose information associated with the supplier's impact on the environment and social issues
- Specific metrics or standards may be written into supplier contracts
- Diversity is another metric actively pursued by J&J
- J&J is heavily invested in sustainability and Biogen's leadership in the field may be important factor in their ongoing contract manufacturing relationship



Green Chemistry: The Regulatory Landscape

- The danger of pharmaceuticals in the environment is a big concern as drugs are designed to be long-lived and stable
- Green chemistry is currently seen as a voluntary initiative
- Green chemistry often conflated by regulators and legislators with good chemicals management
- No regulatory change or successful lobbying for green chemistry within the U.S.
 - Many failed attempts to pass a bill for sustainable chemistry
 - No accelerated review, extension to patent life considerations for green chemistry drugs
 - Department of Commerce: Pro-green chemistry through NIST
 - Department of State: Involved/supported several initiatives including some that are multi-agency
 - US EPA: Previously tried promoting green chemistry – only a remnant is left in the Presidential Green Chemistry Awards Program
 - FDA: Promoting continuous processing for better quality drugs
 - NIH: Currently has no support of green chemistry perspective, in fact having a strong green chemistry program can often work against firms in NIH context

DISTILLING WHAT CUSTOMERS VALUE

Stakeholder Heat Map

	Patients	Patient Advocacy Organizations	Hospitals	Doctors	Insurance Companies	Contract Manufacturing	
Access to Medicines	Key	Key	Key	Key	Key	Key	Key
Price and Affordability	Key	Key	Key	Key	Key	Key	Important Now
Efficacy	Key	Key	Key	Key	Key	Key	Important in 5-10 Years
Safety & Side Effects	Key	Key	Key	Key	Key	Key	
Sustainable Pharmaceuticals Supply Chains	Key	Key	Key	Key	Key	Key	
Research Sharing Between Institutions	Key	Key	Key	Key	Key	Key	
Clinical Trial Design	Key	Key	Key	Key	Key	Key	
Price Transparency	Key	Key	Key	Key	Key	Key	
Access to Information on Drugs and Clinical Trials	Key	Key	Key	Key	Key	Key	
Environmental Impacts of Manufacturing & Transport	Key	Key	Key	Key	Key	Key	
Waste Generated From Use	Key	Key	Key	Key	Key	Key	

Customers Derive The Most Value From Social Sustainability Programs

Patients, doctors and hospitals are focused on efficacy, safety, affordability

- **Patients** care most about being able to afford their prescriptions – be it through lowered list prices, financial assistance programs or the availability of less expensive biosimilar treatments
 - Patients want to be able to easily access information about the drugs they take
- **Doctors** prescribe products that lead to positive health outcomes – they are generally unaware of exact pricing but support affordability
- **Advocacy organizations** seek a streamlining of research and medical data sharing to decrease a potential drug's research and development timeline and cost

**"Just find treatments, then we will worry about sustainability."
~Patient with FSH**

Biogen Salesforce Feels These Effects

Biogen has mission to ensure no patient goes without medication, and provides financial assistance to any patient who cannot afford medication.

- Sales representatives are aware of the need and desire for affordable medication, receiving feedback from doctors and patients about the issue
- Financial assistance programs do impact prescription-writing by doctors in coin-flip situations (e.g. new diagnosis and starting a patient on medication, or switching to new treatment for medical reasons – affordability is a big plus)¹
- Patients may not be aware of financial assistance programs (cannot be directly solicited due to HIPPA), and may not even think to ask for help if a medication is unaffordable for them

How many patients fall through the cracks? There are likely opportunities for increased education or promotion of information through different channels to ensure those who need assistance the most are actually getting it.

Source: Interview with a Biogen sales rep

Customers Don't Derive Value From Environmental Sustainability – But They Still Care

Environmental Sustainability matters but is not front of mind for most customers (excluding contract manufacturers)

- Environmental sustainability is clearly beneficial, but the aspects that impact **patients** the most are packaging and material waste generated from use
 - Environmental sustainability can provide direct value to patients insofar as cost savings get passed through in some capacity, either through lowered drug prices or by funneling savings into other social sustainability programs
- **Contract manufacturing** customers derive the greatest value from the environmental sustainability efforts of Biogen
 - Continuing to maintain carbon neutrality, water and energy efficiency, etc. can help Biogen remain competitive in the contract manufacturing market
- **Hospitals** want safe and effective products that are easy to store and transport; price and waste management are becoming increasingly important

ROADMAP FOR BIOGEN

Starting Position: Biogen's Social Sustainability Programs Address Key Patient Concerns

Patient Health Outcomes

AboveMS, MYELOLOCATE, MS-UP and other programs increase patients' engagement and education, improve health outcomes and support underserved populations.

Access to Treatment

Investigational therapy, financial assistance, co-pay and free medications programs, biosimilar treatment are expanding access to treatments and affordability of company drugs.

Product Quality & Safety

Sophisticated packaging technologies, auditing and monitoring on-sight, global supply chain and product sales to protect product quality.

Data/Information Sharing

Supports clinical trial disclosure and data sharing through the EFPIA Disclosure Code/Clinical Trail Transparency policy.

Source: Internal Biogen Documents

Moving Forward: Sustainability Will Remain Critical For Business

- There is a clear, undeniable trend that sustainability, both the environmental and social aspects, is becoming an integral part of the biopharmaceutical industry landscape and one of the key factors that will determine companies' competitive positions in the next 5-10 years
- Given sustainability's relatively recent emergence into the mainstream, there are still differences in issue understanding and prioritization among Biogen's customer groups. These differences will dissipate as customers will become more educated and shared common interests become more apparent
- Low customer awareness and gaps in understanding of social sustainability issues create a unique **5-7 year window of opportunity** for Biogen to become an industry leader in social sustainability, capturing a privileged position with its key customer groups

Next Steps To Continue The Research

Patient Education

- Explore opportunities to engage in further educational patient outreach, potentially with patient advocacy organizations

Packaging & Waste

- Look further into where Biogen can align product packaging and transportation with major purchasers' needs and reduce the waste from product use

Research Sharing

- Investigate additional opportunities for Biogen to work with research institutions in sharing and streamlining research

Price Transparency

- Conduct an internal stakeholder assessment on the viability of working towards price transparency in the next two to five years

Green Chemistry

- Discuss with other industry leaders the opportunity to push for green chemistry legislation in the United States

Important Considerations For Future Action

- **Explore opportunities to engage in educational patient outreach**
 - Is there value to including the ecological footprint and/or cost of each medication produced by Biogen on its website?
 - Is it beneficial and is there room for Biogen to work in tandem with patient advocacy organizations in order to educate patients on its social sustainability efforts?
- **Conduct an internal stakeholder assessment on the viability of working towards price transparency in the next two to five years**
 - Is there an opportunity for Biogen moving forward as an industry leader in price transparency?
 - What are the potential costs, risks, and benefits of Biogen moving towards implementing total or partial price transparency?
- **Look further at where Biogen can align its product packaging and transportation with major purchaser needs and reduce waste from a product's use**
 - What has Biogen done so far to minimize packaging waste and make its products easy to transport, store, and dispose?
 - Can Biogen create a viable medication recycling and waste program to reduce potential environmental impacts of its products' use and disposal?

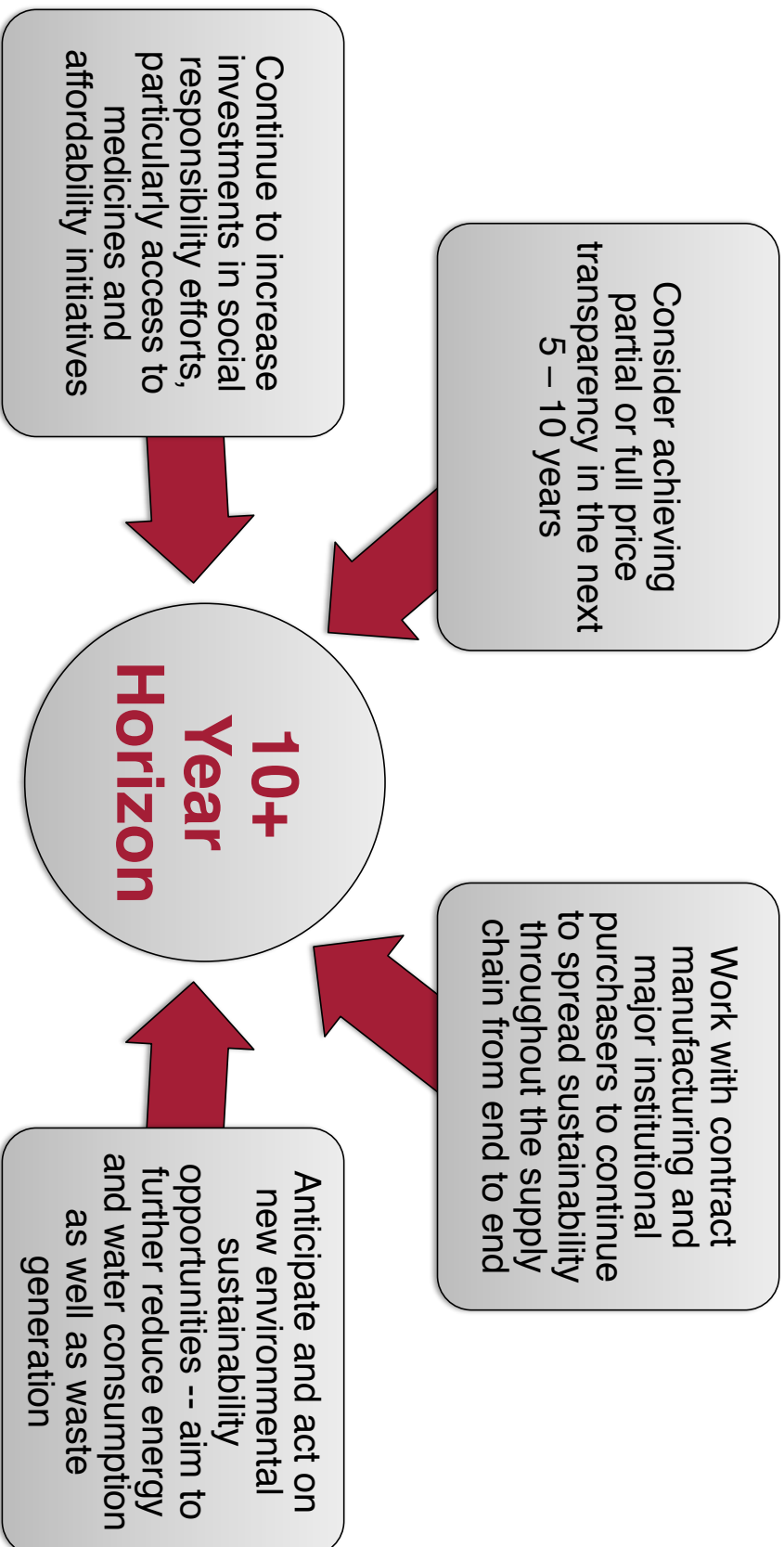
Important Considerations For Future Action

- **Explore further opportunities for Biogen to work with patient advocacy organizations and other research institutions in sharing and streamlining research**
 - What dangers does this present to Biogen's intellectual property, and do the potential efficiency benefits it may provide overcome them?
 - Is there an opportunity for Biogen to be a leader in information sharing by supporting the development and maintenance of a data/tissue bank?
- **Discuss with other industry leaders the opportunity to push for green chemistry legislation in the United States**
 - Is there room for the industry to work with Congressional leadership to push for green chemistry provisions?
 - Is this something that Biogen should even be worried about now or in the next decade?

What Should Biogen Do Now?

1. Continue with environmental sustainability efforts as the baseline for doing business and to meet societal expectations on how leading companies should operate
 - General public and customer focus on climate change and other environmental issues will intensify in the next 10 years
2. Increase emphasis on social sustainability issues, i.e. affordability, access, and efficacy
 - Explore ways to pass on cost savings from more efficient manufacturing processes to patients
3. Educate patients on Biogen's current social and environmental sustainability efforts and what positive impact these initiatives have on patients today
 - Partner with patient advocacy organizations such as the National MS Society for a wide-spread education campaign on the sustainability efforts of the biopharmaceutical industry
 - Create an infographic on each medication's website detailing its environmental and social footprint, how Biogen has worked to reduce its associated negative externalities, and what this means overall for the cost and sustainability of the drug
4. Work with patients and hospitals to reduce packaging waste and develop a comprehensive medication recycling & by-product disposal program
 - Consider implementing a reverse logistics system for Biogen's biopharmaceuticals

Potential Long Term Initiatives



Appendix A

SURVEY DESIGN SPECIFICS & ADDITIONAL PATIENT FEEDBACK

Survey Design & Audience

- Sent by email to a select e-list of active members in a patient advocacy network by the FSH Society
- Open-ended definition of sustainability contained within the survey
 - "Note: sustainability efforts include environmental and social impact programs, from climate change initiatives to increasing access to medicines – it is intended to be a broad definition."
- Audience
 - Individuals with a debilitating, progressive medical condition with no known cures who are active members of the FSH Society, and their caregivers
 - Per conversation with an Executive Leader of the FSH Society, patients who are active in FSH advocacy tend to be highly educated and more politically active than non-members and the general public
 - Estimated number of recipients of the survey email is approximately 2000
 - The Executive of the FSH Society we worked with stated that he sent the survey to a select group of individuals with FSH and was surprised when we got as many responses as we did; he expected the total number of responses to be much less
 - Response rate of approximately 5%

No formal demographic information of the sample is available. It should be assumed that this is not a perfectly representative sample of the general population who have a serious, progressive disease.

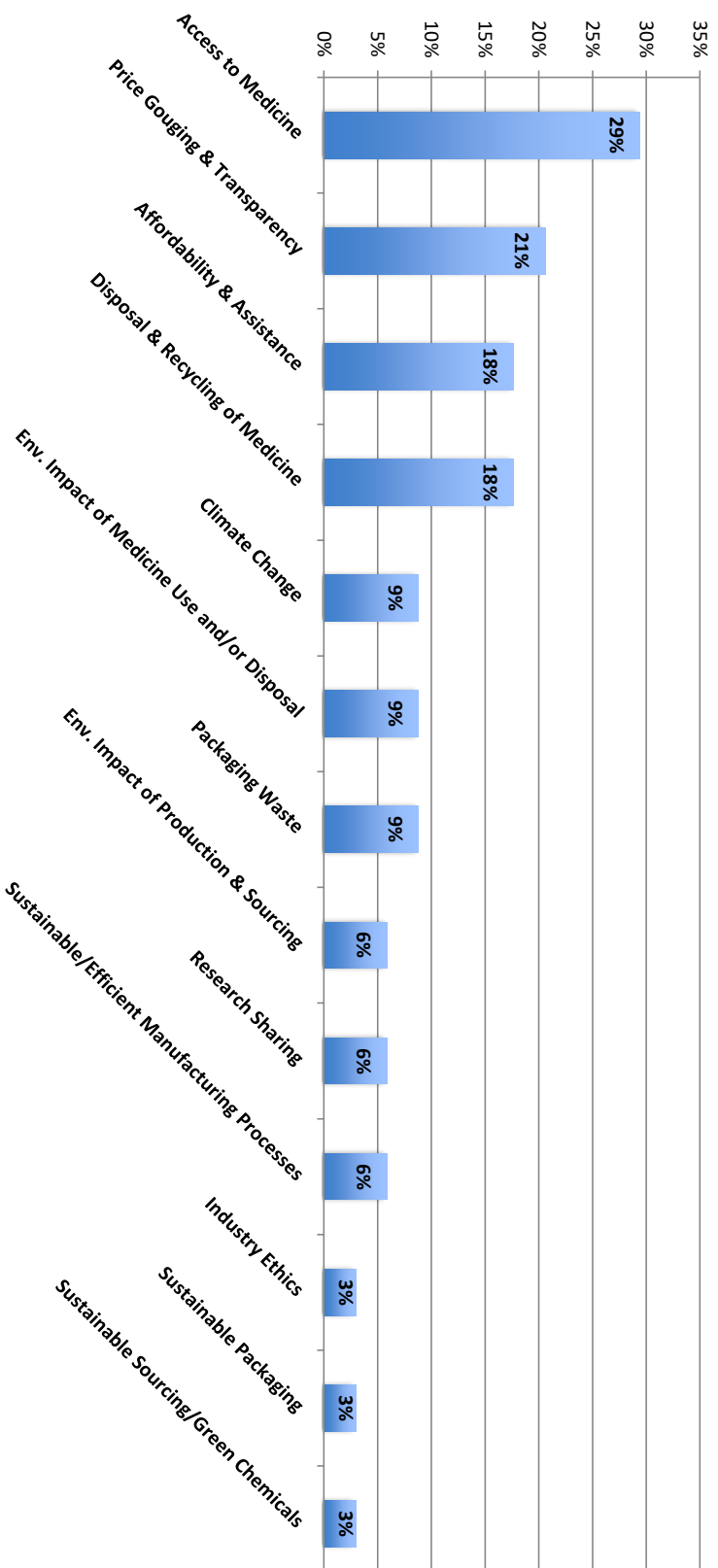
Survey Questions

Seven questions in an anonymized Qualtrics survey

1. Patient Status – Individual with FSH or a Caregiver of an Individual with FSH
2. What are your biggest concerns about your prescription medications? *[Choose Top 3]*
3. Do you know which drug companies that make the medicines you are prescribed? *[Choose One]*
4. Do you know anything about the sustainability efforts of the companies that make your medicines or of the pharmaceutical industry in general? *[Choose One]*
5. Could you name some sustainability programs that you are aware of?
6. Are there any sustainability initiatives that are or will become particularly important to you? *[Free Text]*
7. Do you have any final thoughts on sustainability in the pharmaceutical industry you would like to anonymously share with us? *[Free Text]*

Patients – A Quantitative Analysis of the Qualitative Free-Text Answers

Percent of Responsive Survey Respondents (34 Total) who used the Free Text Area of the Patient Survey and Mentioned the Following Sustainability Issues



Patients – What else do they say?

Selected Answers (Note: minor grammatical changes were made)

- "We need sustainability in every industry."
- "MORE DISCLOSURE"
- "My problem is with the insurance company - every EOB is 3 pages long. Also, the mail order pharmacy sends mess in plastic that is not recyclable and there is always paper included that has to be recycled. Also, pharmacies - especially mail order, send 30 pills in a bottle that could fit 500. What a waste!!"
- "Not sure this is the pharmaceutical industry's issue but as a patient I have been given prescriptions that I have not tolerated and then I end up wasting a bunch of medicine. Also when given any prescription it comes with several sheets of paper explaining the possible side effects, etc... Once I've read this once I don't feel the need to keep receiving the same information and wasting the paper. Perhaps this type of info could be included the first time a prescription is filled and then the patient signs off on it after that, acknowledging that they have received the info and do not wish to receive it again. Or perhaps that info could be emailed to patients if they wish. I would hope that, given how profitable this industry is, that they are taking steps to make sure their buildings and manufacturing processes are as energy efficient as possible -- utilizing renewable energy where it's available and taking steps to insulate/upgrade older buildings."

Patients – What else do they say?

Selected Answers (Note: minor grammatical changes were made)

- "I know little about the sustainability of the pharmaceutical industry, but would at first guess presume that they share some characteristics of the industrial chemical industry in general, whose sustainability records are among the worst in the nation and world. I am heartened by this survey, which suggests that the pharma industry is at least interested in the appearances of sustainability, and perhaps sustainability itself (or that some MIT students think they should be)."
- "Companies need to pick their core priorities and do them well. There are so many that it's probably impossible to do them all."
- "Providing access to medicines to people who may not be able to afford them."
- "Concerned about environmental pollution put into the water supply from medicine."

Patients – What else do they say about access to medicine and affordability?

Selected Answers (Note: minor grammatical changes were made)

- "I am horrified that big pharma can charge whatever they like for drugs. This seems insane compared to other countries, which limits the profits on drugs especially for life changing illnesses. I can't blame people for going to Canada (and elsewhere) for their necessary medicines."
- "Sustainability is an important element in today's world. However, price gouging is more important for this particular type of product. Controlling drug prices paid by the consumer 'trumps' sustainability"
- "Cost differential of drugs is significantly higher in USA than other countries despite drugs being manufactured abroad in many cases."
- "The pharmaceutical industry appears to be mainly interested in maximizing profits for the pharmaceutical companies."
- "Honesty in need to set prices and consistency from one prescription to the next."
- "In our current system, we are asked to participate in trials for medicine that we may not be able to afford. When a family member has a severe medical problem, normal rational thinking no longer applies. A parent will mortgage their home to buy a therapy for a child based on a successful trial by a good firm. People lost their homes to buy a new drug for sons with Duchenne Dystrophy that ended up not working. The system has a devastating history."

Appendix B

INTERVIEW QUESTIONS

Questions for Advocacy Organizations

1. Do you have any indication that MS patients care about the social and environmental sustainability efforts of the companies that produce their medicines?
 - If so, in what form (e.g. do they care more about reducing water/energy use, being carbon neutral, price reductions, access to medicines, diversity in medical trials, green chemistry)?
2. What aspects of sustainability does your organization think the medical industry cares about most? Why?
3. Similarly, what areas does your organization focus on in its patient-directed, industry-directed, and regulatory-directed advocacy work?
4. Do you have any bills or regulations you are trying to push for in the US or Europe that you would be willing to share with us?
5. Do you see patients, hospitals, and/or insurance companies putting a stronger focus on sustainability in the next 5-10 years? Why? What aspects?
6. Do you have any data from past surveys/reports that you would be willing to share with us?

Questions for Doctors

1. How do you find out about new medicines and clinical trials?
2. Are you aware of the social and environmental sustainability efforts of pharmaceutical companies whose medicines you prescribe to your patients?
3. Do you and/or your patients care about the sustainability efforts of these pharmaceutical companies?
 - If so, what are the most important initiatives that pharmaceutical companies can undertake?

Questions for Insurance Companies

1. Are you, in your role as a representative of an insurance company, aware of sustainability (environmental & social) efforts in the industry?
2. Do you care about sustainability efforts by industry leaders?
 - To what extent does it impact coverage/purchasing decisions?
 - What aspects of sustainability do you care about the most?
 1. Carbon, water, energy, green chemistry, access to medicines, social programs
 - Does your insurance company look at the upstream manufacturing (e.g. Biogen, Takeda, Novartis, Teva, other contract manufacturing) of the supply chain?
 - Do you think your insurance company will put more focus on sustainability in the next 5-10 years?
 1. Why? What aspects?
 2. To what extent do you think it will be important for your hospital in the next five years?
3. Why do you care? Is it because of required reporting, regulations, or other?
 - Do you have any indication that employees or patients care about sustainability?
4. Are there any indications that the insurance industry as a whole is becoming more concerned about the sustainability efforts of drug companies?

Questions for Hospitals

1. Are you aware of sustainability (environmental & social) efforts in the industry?
2. Do you care about sustainability efforts by industry leaders?
 - To what extent?
 - What aspects of sustainability do you care about the most?
 1. Carbon, water, energy, green chemistry, access to medicines, social programs
 - Does your hospital view the upstream manufacturing (e.g. Biogen, Takeda, Novartis, Teva, other contract manufacturing) of the supply chain?
 - Do you think your hospital will put more focus on sustainability in the next 5-10 years?
 1. Why? What aspects?
 2. To what extent do you think it will be important for your hospital in the next five years?
3. Why do you care? Is it because of required reporting, regulations, or other?
 - Do employees care about sustainability?
4. Down the value chain, do patients care/pay attention to sustainability efforts of hospitals? How does this manifest?
 - Do you have any indication that patients care about sustainability? If so, in what form?

Questions for Finance-ESG Specialists

1. How do large financial institutions view the sustainability efforts of pharmaceutical and biopharmaceutical companies?
 - Is the majority of concern revolving around potential risk to financial investments?
 - Is there a growing consciousness among socially responsible investors about drug company operations?
2. Are there any major trends in finance/ESG that will impact the pharmaceutical/biopharmaceutical industry in the next 5 – 10 years?
3. How do ESG specialists evaluate the sustainability efforts of companies?
 - What aspects of sustainability are the most important to your firm?

Appendix C

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